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DIESEL PROGRESS

MAY, 1942

CLEAN CROSSHEADS *Evidence of Perfect Piston Seal*

Left. Inspecting crosshead and guide of Texaco-lubricated 1250-hp. Nordberg. Entire inside of engine's crankcase is clean . . . evidencing freedom from stuck rings and blow-by.

Right. Piston, rod, and bearing assembly of Nordberg Diesel. Engine parts stay cleaner and freer from carbon, when lubricated with Texaco.

THEY PREFER TEXACO

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

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FRED ALLEN every Sunday night. See your local newspaper for time and station.

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Highly resistant to the formation of gum, sludge and hard carbon, these Texaco oils keep piston rings freer, valves cleaner, ports open, assuring maximum power and greater fuel economy. Result—

More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

The outstanding performance that has made Texaco first in the stationary Diesel field, has made it first in the fields listed in the panel.

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TEXACO

TEXACO Lubricants and Fuels

FOR ALL DIESEL ENGINES

HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

DIESEL PROGRESS for May, 1942. Volume VIII, Number 5. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 2 West Forty-fifth Street, New York, N. Y. Rex W. Wadman, President. Acceptance under the Act of June 5, 1934, at East Stroudsburg, Pa., authorized March 27, 1940. Subscription rates: $5.00 per year, single copy, 50c.

DIESEL and GAS ENGINE PROGRESS

REX W. WADMAN
Editor and Publisher

FRONT COVER ILLUSTRATION: Official U. S. Navy Photograph.

TABLE OF CONTENTS ILLUSTRATION: Laying double underground telephone cable from Sacramento, California, to Salt Lake City, Utah, with two Caterpillar Diesel tractors hauling excavator, cable layer, and refiller in tandem.

DIESEL PROGRESS for May, 1942, Vol. VIII, No. 5. Published monthly by Diesel Engines, Inc., 2 West 45th Street, New York, N. Y. Tel. MUrray Hill 2-7333. Subscription rates: $5.00 per year, 50c per copy.

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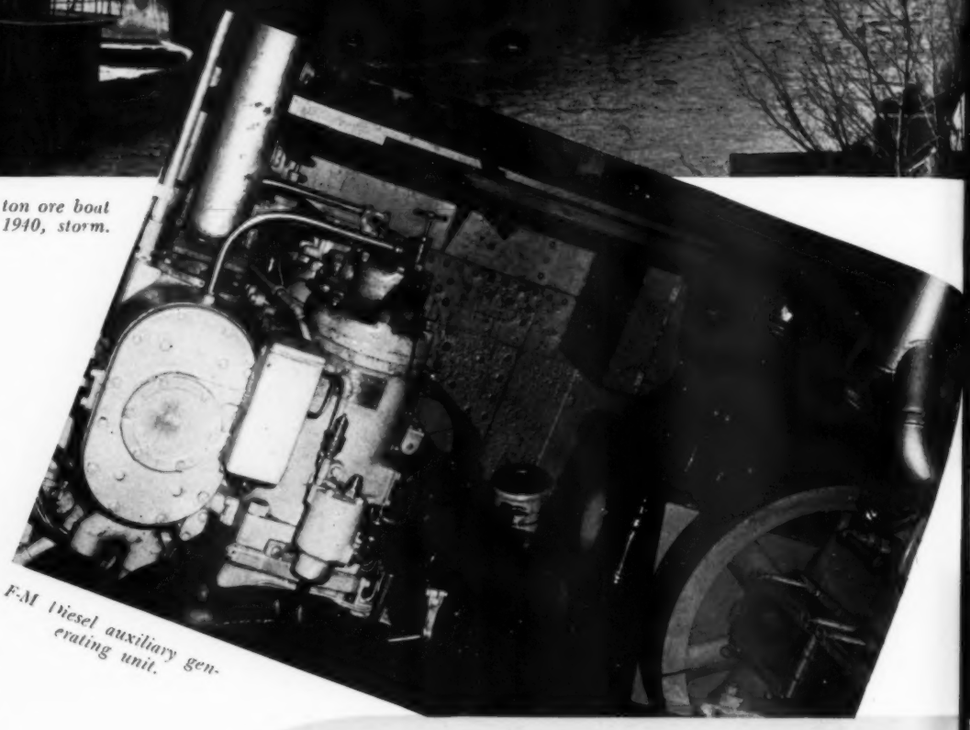
Diesel tug "John Roen III" towing in the 6,000 ton ore boat "Sparta" for repairs after the Armistice Day, 1940, storm.

ANOTHER DIESEL CONVERT!

Former Chicago Fire Tug Converted for Ice Breaking and Great Lakes Service

By WILBUR W. YOUNG

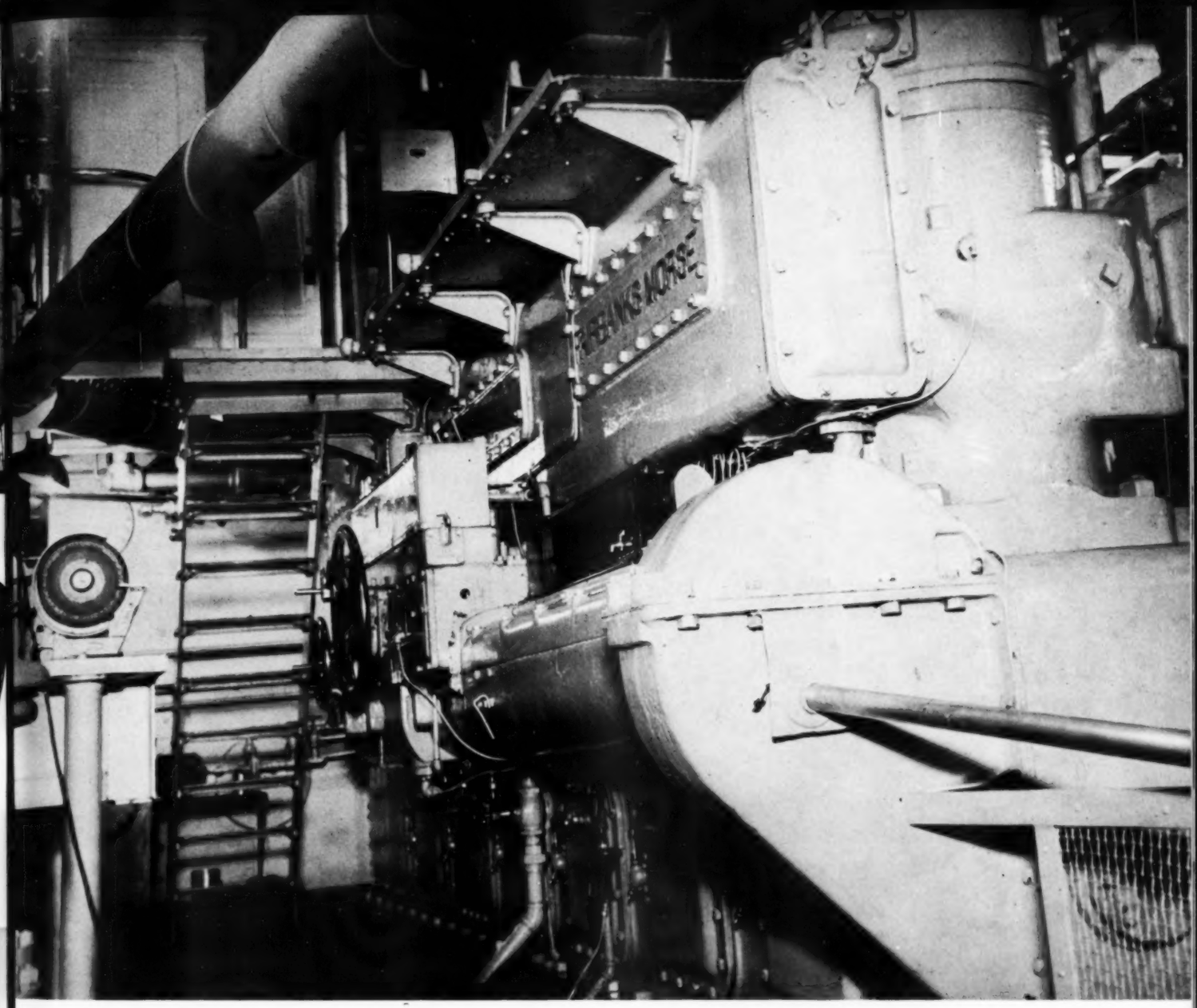


F-M Diesel auxiliary generating unit.

STURGEON BAY, Wisconsin, March 28: The official navigation season on the Great Lakes opened on March 26, two weeks earlier than in any previous year since formal records have been kept. Up at Duluth, the event was marked by the winning of a nine-hour fight through pack-ice ten to fifteen thick in the ship canal by an ore boat with the aid of tugs. Down here, similar scenes were being enacted and will continue to be for two or three weeks. Here, there are four shipyards turning out Diesel ships of various classifications—making this town, with a population of 4,700, hum. And a great tug, recently new to these waters, is helping to open ice-bound bays to early shipping.

The opening of the season finds the Roen Steamship Company engaged in extensive towing, transport, and salvage operations out of this booming inland port, ready with its recently rebuilt and repowered Diesel tug *John Roen III*—a real tough craft and a natural ice-breaker. Right now her newly installed marine Diesel is pushing the sturdy *John Roen III* through ice, ahead of an ore boat making for Green Bay and some time tonight or early in the morning she will be reported in. Schedules don't mean a thing when a tug is breaking

Captain John Roen, genial head of the Roen Steamship Company.



Control side of the 840 hp. Fairbanks-Morse main Diesel. The Naylor spiral welded pipe is the intake for the auxiliary Diesels.

ice; you just wait for her to win through the ice. Meantime, there is a mighty interesting story back of *John Roen III*. She has an all-steel hull built in 1898 by the Chicago Shipbuilding Company, South Chicago, Illinois, for the City of Chicago as a fire tug. She measures 118′ overall length, 24.2′ beam and 13′ depth.

Named *Illinois* and steam powered, she served until 1941 when the Roen Steamship Company purchased and removed her to its yard here. Engines, boiler, and cabins were removed and the tug was drydocked for overhauling of the hull and renewal of propeller and shaft. Stiffening was added to hull frames and stringers, and engine foundations were reinforced. Her bow was redesigned and equipped for ice breaking, new steel cabins and pilot house were built, and she was rechristened *John Roen III*. She will be used for general towing service on the Great Lakes and will probably enter ocean service in winter months.

In her copious machinery space were installed a Diesel marine main engine and two Diesel auxiliary engines with much room to spare. The main engine is a Fairbanks-Morse, 6 cylinder, 16″ bore, 20″ stroke, unit rated for this application at 840 hp. and swings a 91″ x 53″, three blade propeller at 250 rpm. An 8″ tail shaft is used in conjunction with a Kingsbury thrust bearing. The auxiliaries are a Venn-Severin, 60 hp., Diesel, V-belted to a 40 kw. Crocker Wheeler generator and a 30 hp. F-M Diesel also V-belted to a North-western 22 kw. generator. For protection of the main engine, a pyrometer is fitted and Maxim silencers handle both intake and exhaust. To complete the engine room picture, there are two fuel tanks of 18,000 gal. total capacity forward of the main engine with a 300 gal. day tank below the engine room deck. The transfer pump is a F-M 1¼″ rotary unit. Socony-Vacuum lube oil for the Diesels is cooled by a Schutte & Koerting heat exchanger. Then there are two Ingersoll-Rand compressors with Allis-Chalmers and G.E. motor drives respectively. Two F-M 4″ centrifugal pumps with 10 hp. F-M motors are arranged to serve circulating water or fire systems, as well as bilge, with a 1½″ Emerson bilge pump and a Western Electric circulating water pump as auxiliaries. There are also Delco fresh water and sanitary pumps. It is noted that all pumping and air compressor services are

The "John Roen III" on trial run in Sturgeon Bay after conversion from steam to F-M marine Diesel drive.

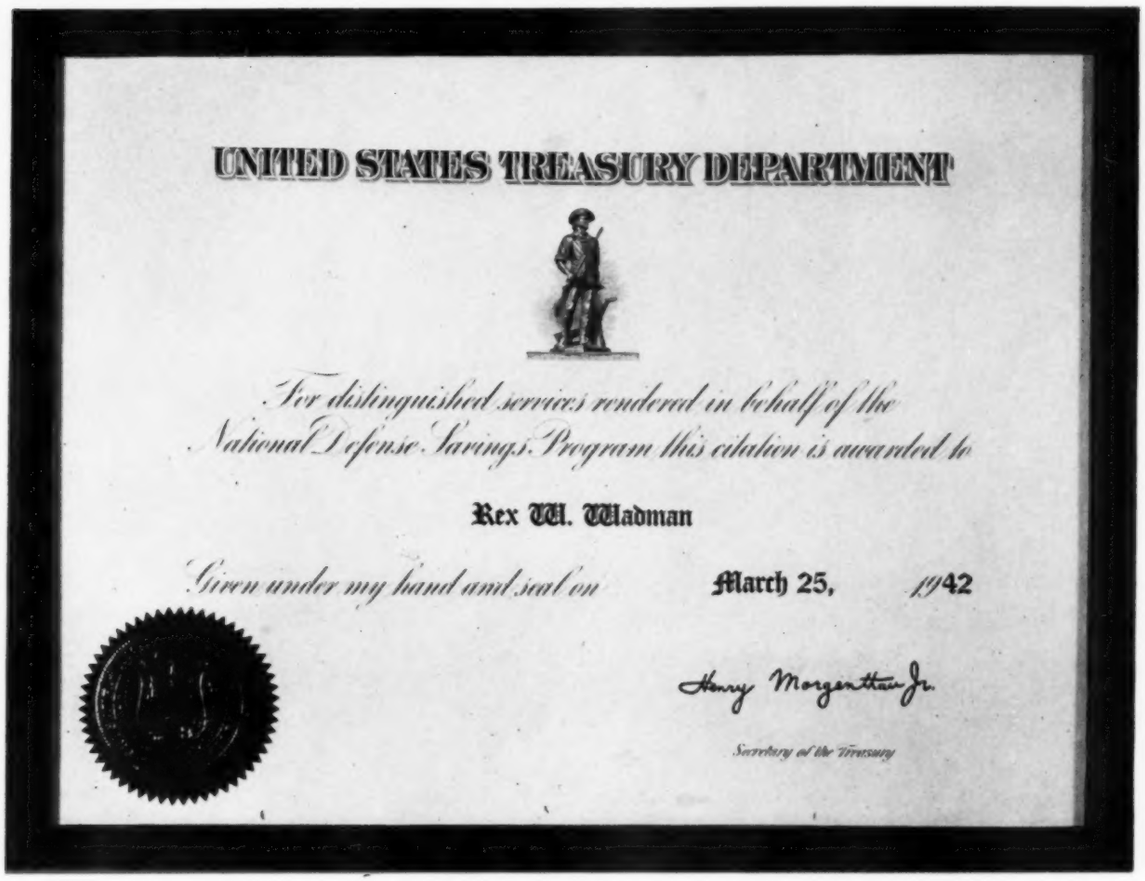
electrically driven, which places complete dependence on the Diesel generating units.

Mechanically equipped for gruelling work, the *John Roen III* also carries excellent quarters for her hard working master, mate, and crew, totalling eight. Insulated throughout and lined with Masonite, she affords real comfort in every quarter. Atop the main cabin and aft of the pilot house are master's and mate's quarters. In the pilot house are found Sperry Gyroscope electric steering gear and Kelvin-White magnetic compass. Also in the main cabin is the galley which is fitted with a Shipmate oil burning range. Crew's quarter's below decks forward are large and comfortable. All in all, *John Roen III* is a thoroughly capable tug and she is proving her mettle at the beginning of her new career in this eventful opening of the Lake's shipping season. Her F-M propulsion Diesel may never be more severely driven than during these few weeks of ice-breaking assignments when the important cargoes must move. Diesel tug performance is not new to the Roen organization. In 1939, the Company acquired the *Sinclair,* a 78′ x 18′6″ x 10′3″ all steel steam tug formerly owned by Great Lakes Towing Company, overhauled and repowered her with a Fairbanks-Morse 360 hp. Diesel, and rechristened her *John Roen, Jr.* The excellent performance and earning power of this tug left no doubt in the minds of her owners when it came to selecting Diesel to power their latest and largest tug, the *John Roen III.*

How better could Diesel economy be exemplified than in Capt. Roen's own comparison of his three tugs—"The big Diesel tug, *(John Roen III)* is twice as powerful as the steam tug *(John Roen)* and costs about the same to operate; the small Diesel tug *(John Roen Jr.)* has about the same power as the steam job and costs half as much to operate."

Capt. John Roen, President of Roen Steamship Company, began back in 1920 with a few small lumber hookers in the pulp wood trade, soon acquired a string of sizable barges and is now one of the best known and widely liked operators in these parts. His company's equipment includes, in addition to *John Roen III,* the F-M Diesel engined tug *John Roen, Jr.,* the steam tug *John Roen* and the barges *City of St. Joseph, Leona, Transport* and *Hilda.* Captain Roen is also associated with the Sturgeon Bay Shipbuilding and Drydock Company, builders of Diesel towboats and operators of one of the busiest yards in this area turning out Diesel ships.

The Roen Steamship Company successfully performed many outstanding salvage jobs following the Armistice Day 1940 storm which brought untold damage to Great Lakes shipping. Among these salvage operations was the raising of the 6,000 ton, self unloading sand and coal boat *Sinoloa* which foundered and sank near Escanaba, Michigan; the 6,000 ton ore boat *Sparta* which ran aground near Munising, Michigan; and the S. S. *Frank J. Peterson,* a Shipping Board type vessel which stranded on St. Helen Island near the Straits of Mackinaw. She was owned by Ogelby Norton who has since refitted and sold her for coastwise service.



UNITED STATES TREASURY DEPARTMENT

For distinguished services rendered in behalf of the National Defense Savings Program this citation is awarded to

Rex W. Wadman

Given under my hand and seal on March 25, 1942

Henry Morgenthau Jr.

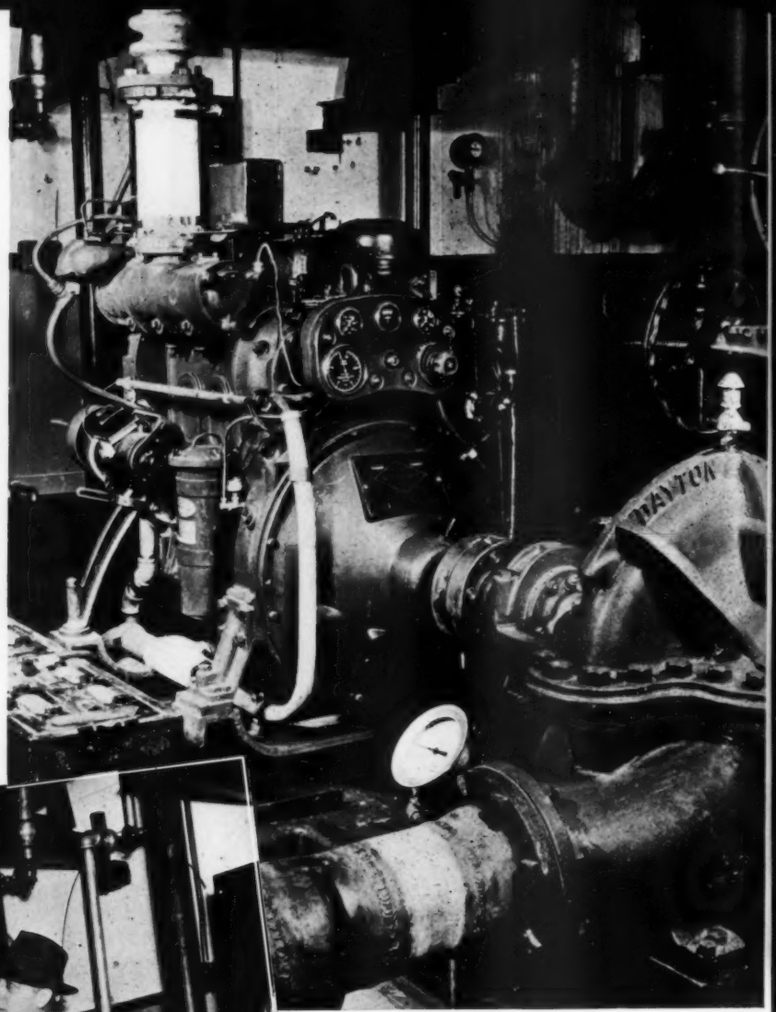
Secretary of the Treasury

YOUR editor is justly proud and appreciative of the citation given me by the Secretary of the Treasury, but I feel a bit shamefaced when I think of how much more I might have done. I worked hard—yes, but I can't help thinking, as I look back over the past few weeks, whether I took this program of selling war bonds and stamps as seriously as I should have done. You know, as I travel from plant to plant, talk to a group of brass hats here, to a group of working men there, I wonder whether any of us have a real comprehension of what is happening to us or of what MAY happen to us. Maybe I'm wrong, but I get the feeling from my contacts that most of us still feel "it can't happen here." Who in the world would have thought a few weeks back that Australia might be attacked and even taken; that India could be invaded and captured. Yet today those two tragedies are impending possibilities. And so, may I say to you—our Government must have money to win this war and protect our way of living—you and I will have to loan or give it to the Government: we can't leave it to the guy down the street. The need for money is NOW. Let's loan all we can NOW through the purchase of War Bonds and Savings Stamps and so eliminate the other alternative.

Rex W. Wadman

An Automatic Diesel-Driven Fire Pump For Stand-By Protection For War Plants, Towns, and Villages

By REX W. WADMAN



A. N. Anderson of General Motors Detroit Diesel Engine Division talking to E. E. Maher of the Dayton-Dowd Company.

SOMEWHERE in Ohio, April 22. On what was a farm a few months ago, now stands a typical new war plant. Acres of new buildings, thousands of new machine tools, and thousands of men working on them—producing vital aeroplane accessories on a twenty-four hour, seven-day cycle. This highly strategic plant was purposely built outside of any corporate limit, which means it has no city or town fire protection or even water service. It pumps its own water supply from a series of wells into its own reservoir. These pumps are motor driven. Given a power breakdown from the local high line service or a bombing trip sufficient to knock out their own power plant, the plant would be without water or fire protection.

Through the collaboration of E. E. Maher, Sales Engineer for the Dayton-Dowd Company, and with the active co-operation of C. A. Genske, Vice President of Synchro-Start Products, Inc., and A. N. Anderson of the Detroit Diesel Engine Division of General Motors, a completely automatic, Diesel-driven fire pump unit was designed and built. I saw the first of these units tried out here today for the benefit of a group of inspectors from the Underwriters, and it's a honey. The darned thing thinks for itself, acts for itself! Super automatic should be the word. Briefly, the unit consists of a three cylinder General Motors, Model 3-71 Diesel engine, two cycle, 4¼" x 5", rated at 60 hp. at 1200 rpm., and 83 hp. at 2000 rpm., driving through a Rockford clutch to a 1750 rpm. Dayton-Dowd type AF fire pump arranged for 100 lb. net working pressure. The unit is automatically controlled by a Synchro-Start automatic controller mounted on the con-

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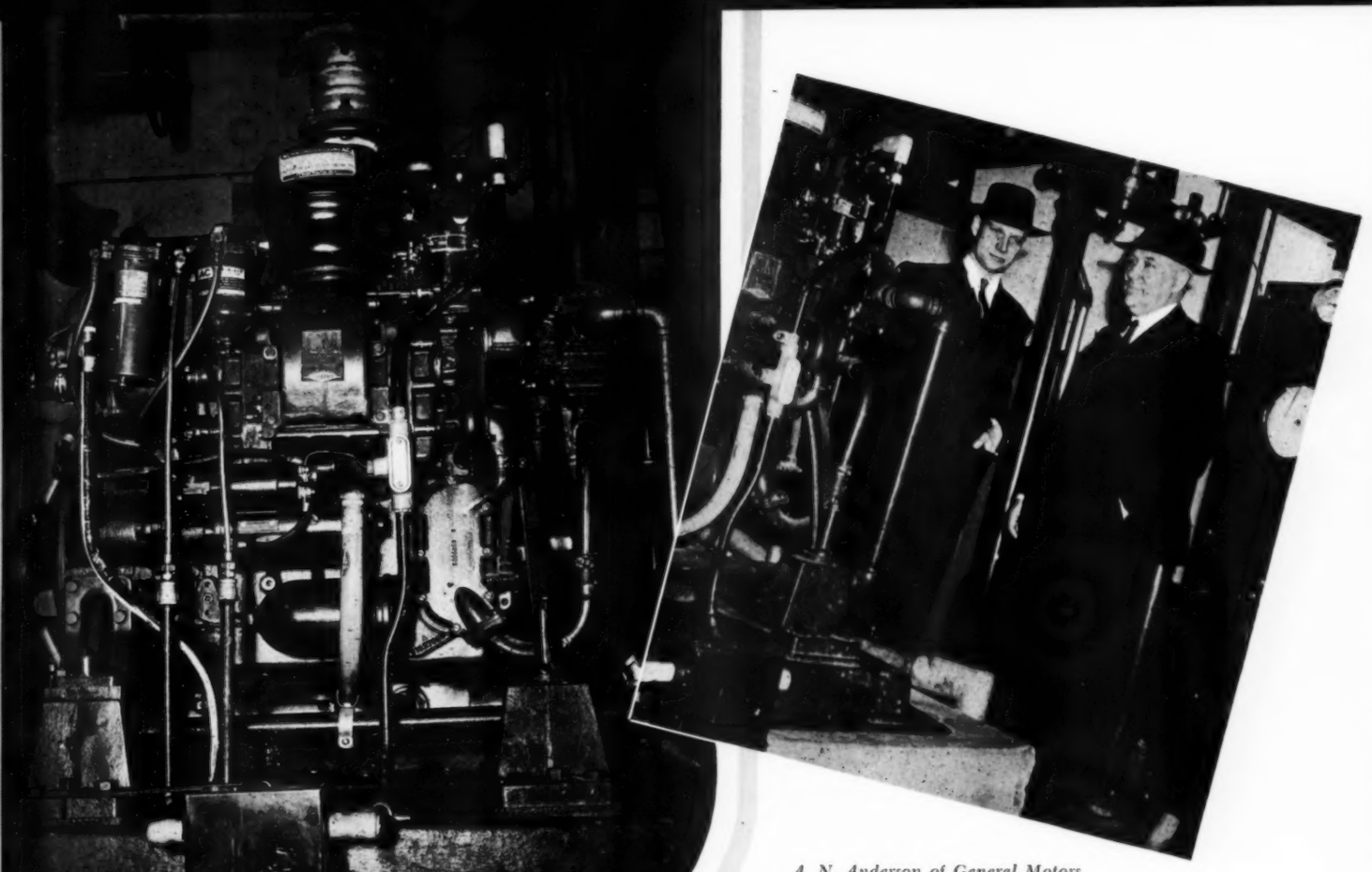
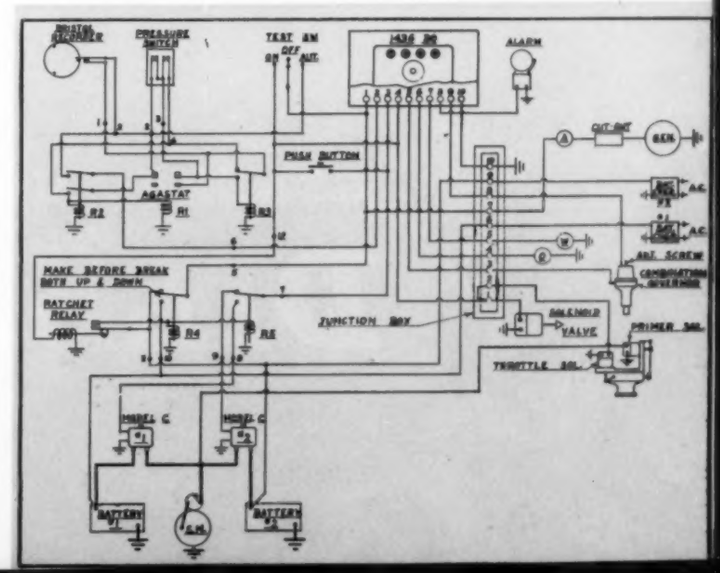


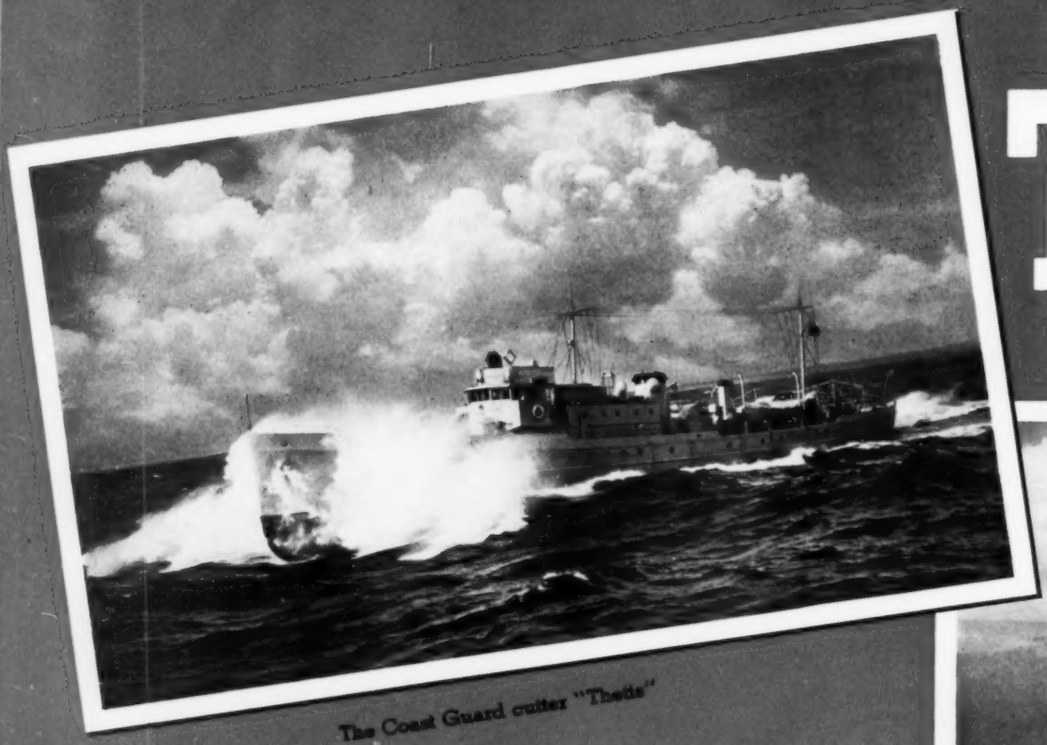
A. N. Anderson of General Motors Detroit Diesel Engine Division and Rex W. Wadman, Editor of DIESEL PROGRESS, watching the tests of the Diesel-driven emergency fire pump which supplies protection to a vital war plant in Ohio.

trol panel. The front of the panel board is equipped with a Bristol Recording pressure gauge which gives an accurate weekly record of the pressure variations. This recorder is fitted with a cam-actuated switch that operates three times a week to start the engine automatically for test runs. In other words, this recorder automatically starts the engine three times a week, lets it run for fifteen minutes, just to keep the unit in good running order, regardless of the times when it is thrown into service by a drop in the pressure on the water lines. A pressure switch is installed in the rear of the panel which controls the starting and stopping of the engine in relation to the fluctuation in water pressure. The unit is equipped with two complete sets of starting batteries, two independent battery chargers. If, when the controller calls for the engine to start, nothing happens, it automatically switches over to the second battery, and if still nothing happens, it rings a bell and flashes a flock of lights, and the operator can then start the engine manually. If the cooling water gets too hot, or the oil pressure drops in the engine, the controller won't shut the engine down—because this is an emergency standby set—but it does flash danger lights and ring a loud, insistent bell to bring the operator on the run. The Underwriters put this unit through its paces here today and it proved itself to be highly practical. It is installed in a deep concrete pit several hundred yards away from the main plant and it can be counted on to supply this vital war plant with ample water and fire protection, no matter what the emergency may be. This is a DIESEL unit, using non-inflammable fuel and very little of it, at that. A new market for Diesel engines is opened up by this development. Every war plant in the country needs one or more of them. Every town or village depending on electric pumping needs one—the market is almost limitless.

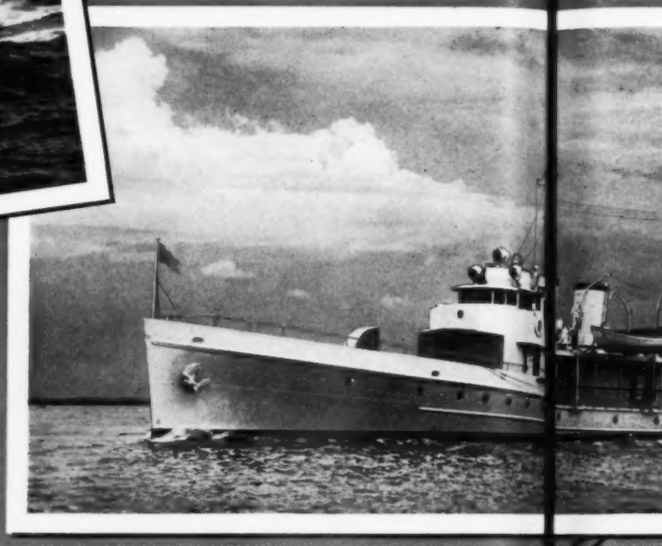


Schematic drawing illustrating how this Diesel engine driven fire pump set is automatically stopped and started in relation to the fluctuation in pressure of the water supply.

They're in



The Coast Guard cutter "Thetis"



The presidential yacht "Potomac"

AMONG the U.S. Coast Guard vessels now actually serving the Navy in the war are many ice breakers, cutters and harbor patrol boats that are powered with GM Diesel engines. And the Navy knows, from its own experience with GM Diesel power, that it can count on these craft to do a highly efficient job.

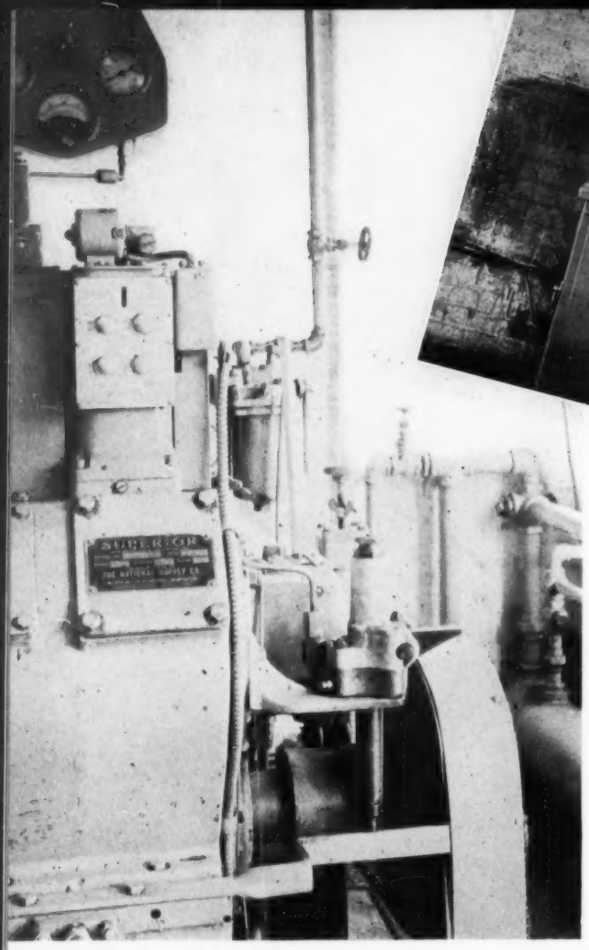
CLEVELAND DIESEL ENGINE DIVISION
General Motors Corporation

GENERAL MOTORS
DIESEL

rin the Navy NOW!

The "Naugatuck" and "Raritan," Coast Guard cutters built by Defoe Boat and Motor Works, plow through foot-thick ice at 12 knots.

The Coast Guard harbor cutter, "Raritan." This powerful tug now demonstrates its ability on regular duty with the U. S. Navy.



Hilco lube oil purifier.

Control end of the Diesel showing Alnor pyrometer, Woodward governor, and Purolator fuel filter.

DIESELS IN COLD STORAGE

By WM. H. GOTTLIEB

COLD STORAGE is an important business in Georgia where the Thomasville Ice & Manufacturing Co. operates a 200,000 cubic foot plant. Motor-driven ammonia compressors serve the storage rooms and also an ice manufacturing plant. Power for all these activities is supplied by a two-engine Diesel plant which remains, after two years of operation, an industrial showplace where visitors are welcome.

Cold storage at Thomasville means more than the usual preservation of meats and other perishable foods. It involves such elements as agricultural credit and the cash value of color. One of the mainstays of the company's storage business is brined okra which is stored in quantity for one of the largest soup companies. The okra would retain its wholesomeness without cold storage but its rich green color would fade to brown and yellow. Preservation of the appetizing green means storage business at Thomasville. Much of the company's volume is in pecans which are stored to prevent the oil in the nuts from becoming rancid. Usually tons of pecans are put in storage months before there is any need for storage so that the producer may use the storage receipts as collateral for bank loans and other transactions.

The principal machines used for manufacturing ice and refrigerating cold storage rooms are two 12 x 12 ammonia compressors each driven directly at 200 rpm. by a 125 hp. motor, one 7 x 7 compressor belted to a 40 hp. motor, and a 4 x 4 compressor belted to a 10 hp. motor.

This 300 hp. aggregate constitutes the major connected load but electric power is required also for lighting and for various motor-driven pieces of equipment such as hoists, pumps, and agitators. For storage and ice manufacturing plants, continuity of power supply is a prime essential. Power failure can mean serious loss to a well stocked storage house. Even if the company has insurance against such losses, cash reimbursement cannot take the place of confidence and prestige won by unfaltering service to customers. One solution to the problem of providing a dependable power supply is an adequate standby power plant. Power units under the same roof as the storage plant eliminate the danger of transmission line trouble, one of the principal causes of power failure.

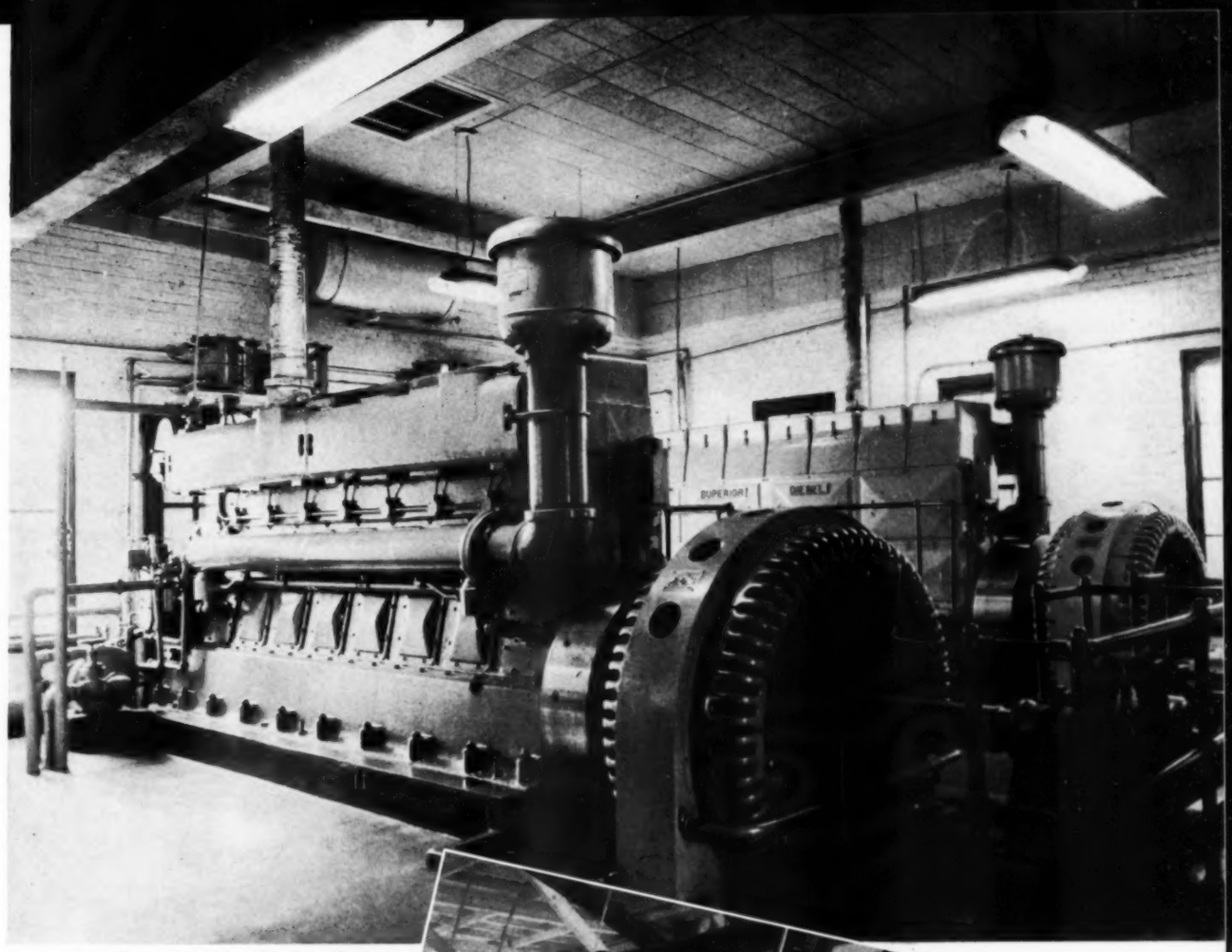
The Thomasville Ice & Mfg. Co. has gone one step further and provided a power plant sufficiently large for continuous operation with full standby protection. Two identical Diesel engines were installed, each capable of carrying the average load. Thus, the company has virtual assurance that there will be no power blackout. Each of the prime movers is an 8 cylinder, four cycle, mechanical injection Superior Diesel of 9 in. bore and 12 in. stroke, rated at 300 hp. at 514 rpm. Each unit drives directly a 200 kw., 80% pf., three-phase, 60 cycle, 2300 volt Elliott alternator with a 5 kw. V belted exciter.

No effort was spared to make this a model plant both in appearance and in operating efficiency. The engines are housed in a one-story brick extension of the building in which the ice plant and compressors are located. The main storage houses adjoin this structure. The engine room is spotlessly clean. The compact, all-enclosed Diesels are finished in gleaming white metal. Illumination is provided by fluorescent lighting fixtures. For ease of operation, the Diesels are in a parallel position with an aisle between.

The engines rotate in opposite directions and all the centralized controls can be reached conveniently from the center aisle. On each engine is a compact gauge board with pressure gauges and an Alnor multi-point exhaust pyrometer. Set flush with the wall at the head of the aisle is the well-equipped switchboard fitted with oil circuit breakers, synchronizer, two voltage regulators, two totalizing kilowatt-hour meters, and all the usual instruments. Thus, an operator can get all essential facts on the operating condition of the power system on a quick walk up the center aisle. Each of the Diesels is equipped with a Woodward isochronous governor which can be controlled from the switchboard.

Equal care was taken to provide the Diesels with protective accessory equipment. The cooling water system is of the closed type with only soft water circulated through the engine jackets by the Goulds centrifugal pump belted to each of the engines. The key unit in the cooling system is a Buffalo evaporative cooler located in a lean-to just outside the power house.

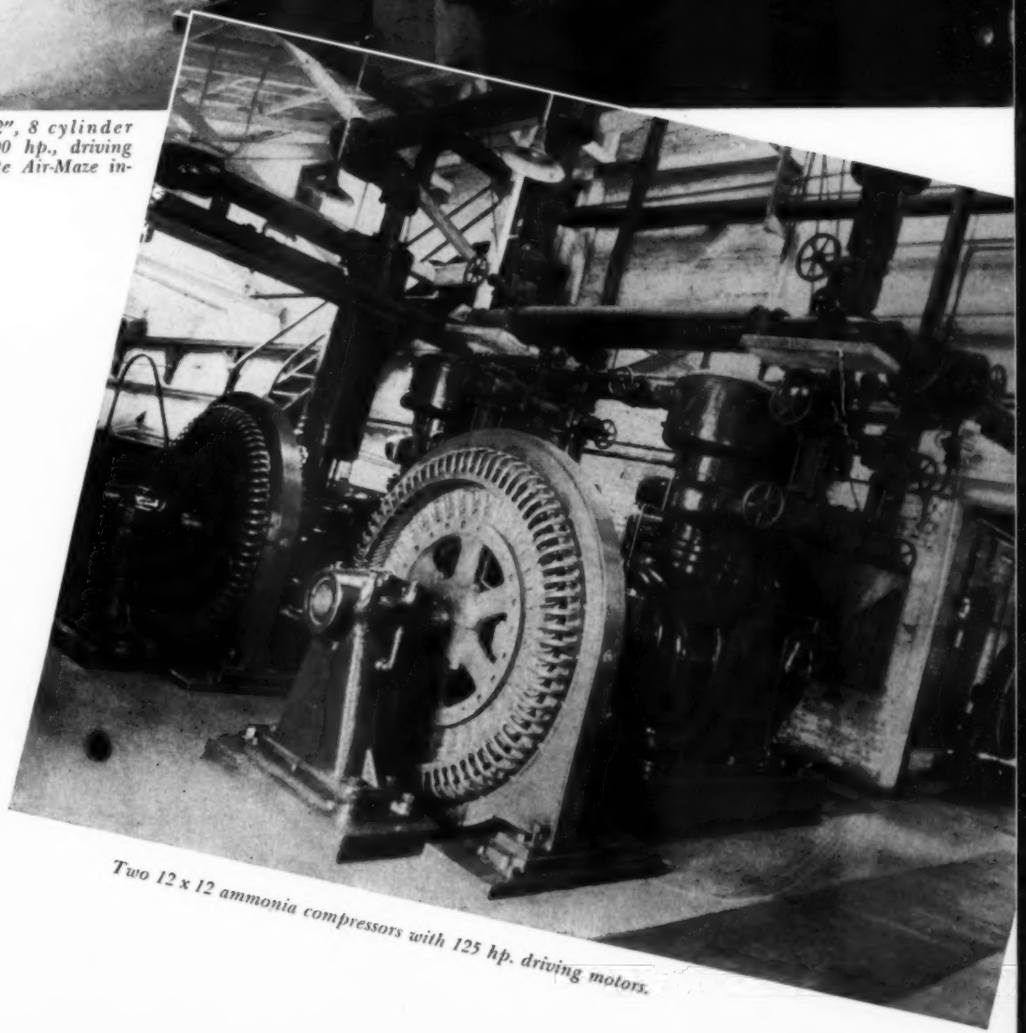
Air, fuel, and lubricating oil are cleaned thoroughly before they reach the engines. Air for each unit is drawn into the intake header through an Air-Maze oil bath filter mounted on



Two Superior 9" x 12", 8 cylinder Diesels, each rated 300 hp., driving Elliott generators. Note Air-Maze intake filters.

the engine frame. Fuel is transferred from the outside storage tanks to the two elevated day tanks inside the engine room by a motor-driven pump and then flows by gravity through a filter to the suction of the pressure pump that supplies the Superior common rail fuel injection system. Lubricating oil flows from a similar over-head supply tank through a duplex Purolator filter to the built-in engine-driven gear pump that supplies oil under pressure to bearings and cylinders. Leaving the engine the lube is pumped to a Hilco activated clay purifier then through a Superior oil cooler back to the supply tank. Exhaust gases are carried from the header of each engine up through the ceiling to Maxim silencers set horizontally on the power house roof. The Diesels are started by air supplied by a motor-driven Curtis compressor and stored in two ample tanks.

With this two-engine plant, the company feels assured of an unfailing, adequate supply of power for years to come. The housewife can rest easy for the okra in her soup will certainly be green, at least until it is marketed.



Two 12 x 12 ammonia compressors with 125 hp. driving motors.

ANCIENT WATER WHEEL REPLACED BY DIESELS

By WM. H. GOTTLIEB

The Tallcot Milling Company Plant at Shanestelet, New York.

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FOR many decades, the stone mill of the Tallcot Milling Company has stood in Skaneateles beside a stream that flows into one of New York's beautiful Finger Lakes. In the early days, the stream was a source of power but, in recent years, modern demands necessitated the purchase of electric power from the municipal power system. Today, the Tallcot Mill once again is self-sufficient because two Caterpillar Diesel engines supply all electricity for the company's needs. Officials have found this to be the most efficient and economical source of power available. The Diesels are producing current for less than half the cost of purchased power.

The new Diesel plant was installed early in January, 1941, and has produced approximately 140,000 kwh. the first ten months of operation. With fuel consumption better than 12 kwh. per gallon, the total expenditure for fuel came to just $815. Despite the practice of changing oil frequently, only 235 gallons of lubricating oil were consumed at a cost of about $120. Tallcot found it unnecessary to make any additions to its operating staff to care for the Diesels. The regular man who handles maintenance of other mill machinery starts and stops the engines. Very little other attention has been required. In the full period of operation, there have been no breakdowns and no repairs. It will be seen, then, that fuel and lube are virtually the sole expenses. Adding a liberal $40 for supplies, the total cost of generating $140,000 kwh. was $975, less than 7 mills per kwh. If the same quantity of power had been purchased from the municipality, the price would have been $2100. In ten months, the Diesel plant has saved $1125. Even allowing for full depreciation charges, the company will show a clear, net profit of $1000 a year on Diesel operation.

The Tallcot Mill produces flour and several types of feed and, in addition, does a great deal of service milling for farmers in the vicinity. All the machinery for this varied activity is motor-driven, with individual motor drives for hammer mills and other large pieces of equipment. To supply these needs, the company installed two Caterpillar Diesels, both driving the same General Electric a.c. generator. The big unit, a 6-cylinder engine of 5¾-in. bore and 8-in. stroke, has a maximum rating of 125 hp. at 850 rpm. and is figured at 90 hp. for continuous service; while the smaller engine, a 6-cylinder, 4¼ in. x 5½ in. unit, can deliver a steady 46 hp. at 1200 rpm. The larger Diesel is coupled directly to the generator while the small engine is V-belted to a pulley on the main drive shaft.

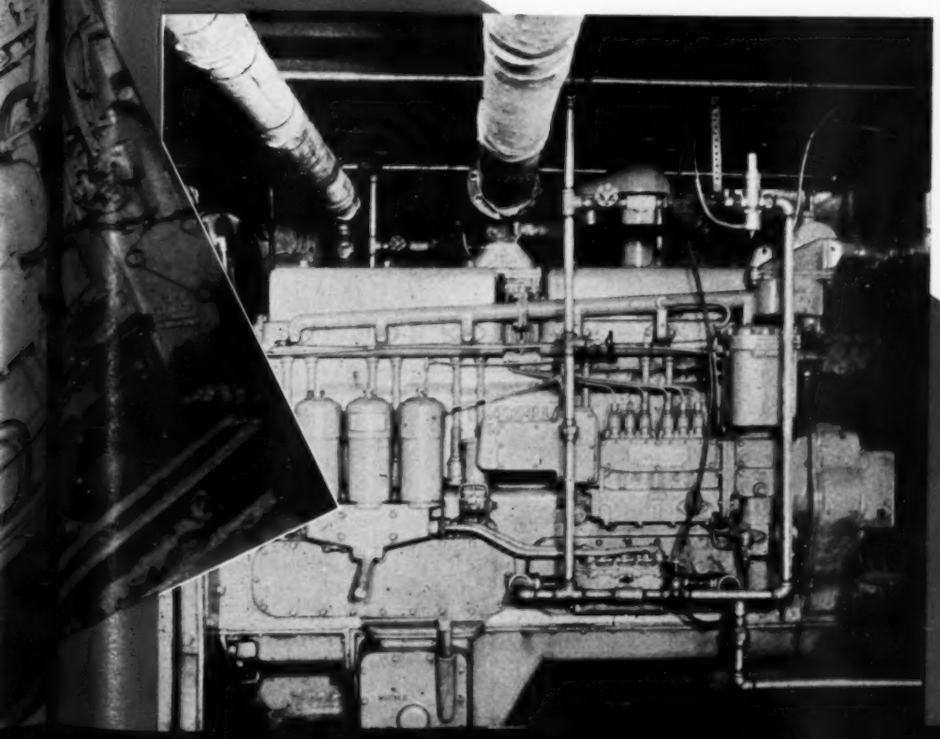
The main engine is adequate to operate all equipment in the mill with the exception of one 50 hp. hammer mill. This Diesel runs continuously throughout the ten-hour day. The hammer mill runs, on the average, two to three hours a day and, to accommodate the increased load, the second Diesel is put on the line for this period. This arrangement makes possible a good operating engine load factor. Any one familiar with mill problems will know, however, that this is not an easy load to carry. Switching on motors as large as 50 hp. throws a heavy overload on the power plant. The operators here assure us that the engines take the sudden overload without difficulty.

The engines burn a standard Diesel fuel obtained in quantity for seven cents a gallon delivered. The fuel is stored in an 8500 gallon tank above ground behind the mill and flows by gravity to a 1000 gallon tank nearby. From this point the fuel is taken by a built-in engine pump and supplied through filters to the individual injection pumps, one for each cylinder. The injection system with its precombustion chamber makes for smooth operation. Each engine is lubricated by a positive force-feed system with a built-in gear pump as the key unit. The system includes a battery of cartridge-like filters and a shell-and-tube oil cooler.

Intake air entering each engine passes through an impingement-type pre-cleaner and an oil bath air cleaner mounted on the engine frame. Exhaust gases from each unit pass out through insulated horizontal pipes to horizontal silencers outside the plant. A single-panel switchboard has been provided with voltage regulator, voltmeters, and ammeters and a totalizing kilowatt-hour meter. Pressure gauges and thermometers are grouped conveniently on each engine.

Since at least one Diesel is in operation throughout the working day, no standby service was considered necessary. President Thorne and Treasurer Feeley are satisfied that their plant is justifying this confidence in Diesel economy and dependability.

Of the plant equipment, the engines and such built-in accessories as fuel and lube pumps, jacket water pump and filters, are Caterpillar. The clutches are Twin Disc, the fuel and lube oils Socony Vacuum, the air filters Donaldson, the exhaust silencers Maxim, and the lube oil coolers Ross. Other equipment includes the General Electric generator and switchboard, the Burlington voltage regulator, and Delco-Remy electric starter.



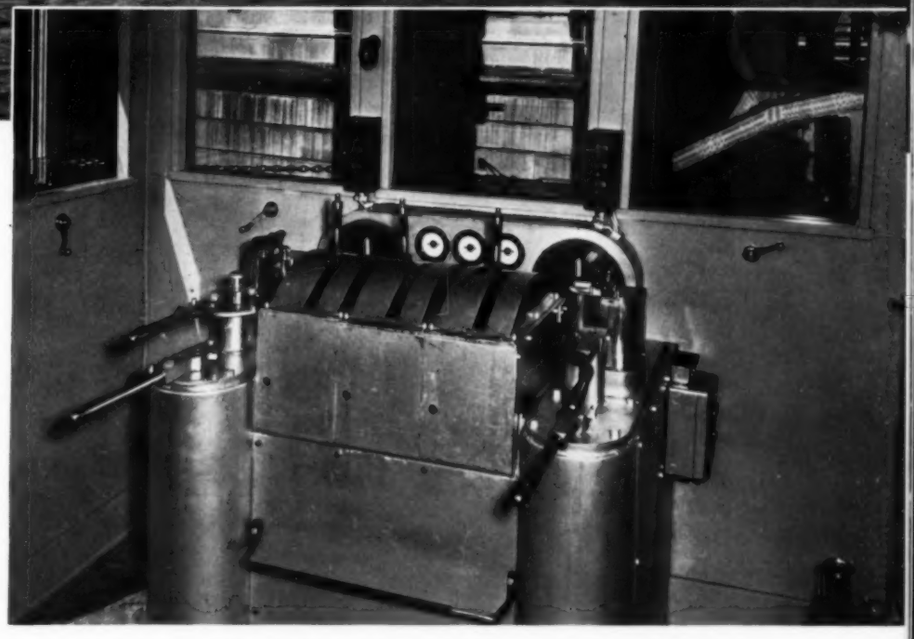
Left: Two views of the Caterpillar Diesels which supply all mill power at 7 mills per kwh. Seen in these views are the Caterpillar fuel pumps, Delco-Remy starter, Donaldson air filters, and Ross lube oil cooler.

The "Susan Moran," the new Diesel-electric tug, was built to augment the already large Diesel fleet of the Moran Towing and Transportation Company. It has been requisitioned by the Government.

TWO BIG FELLOWS FOR MORAN

TWO powerful new Diesel-electric tugboats, the *Margot Moran* and the *Susan Moran*—built to augment the already large Diesel fleet of the Moran Towing and Transportation Company of New York City—have been completed by the Levingston Shipbuilding Company at Orange, Texas. The *Susan Moran* was immediately requisitioned by the Government, and the *Margot Moran* has just completed an initial trip to Tampico, Mexico. Both tugboats are of welded steel construction, 105 feet in length, with a beam of 25 feet, and a draft of 13 feet 6 inches. Both are of 211 gross tons, and are powered by 1,000 hp. 2-cycle General Motors Diesel engines. Tams, Inc., of New York, designed the vessels. To date, fifteen General Motors Diesel-propelled tugboats have been built for the Moran Company.

The "Margot Moran," a Diesel-electric tug, built for the Moran Towing and Transportation Company of New York, just completed its initial trip to Tampico, Mexico.



"ANKER L. CHRISTY" RIVER TOWBOAT DE LUXE

By WILL H. FULLERTON

In the top view the "Anker L. Christy," triple screw Diesel towboat, is seen on trial run with loaded gasoline barges in the Mississippi River. Above: Pilot house view showing engine and rudder controls. Note the Weston electric tachometers, one for each main Diesel.

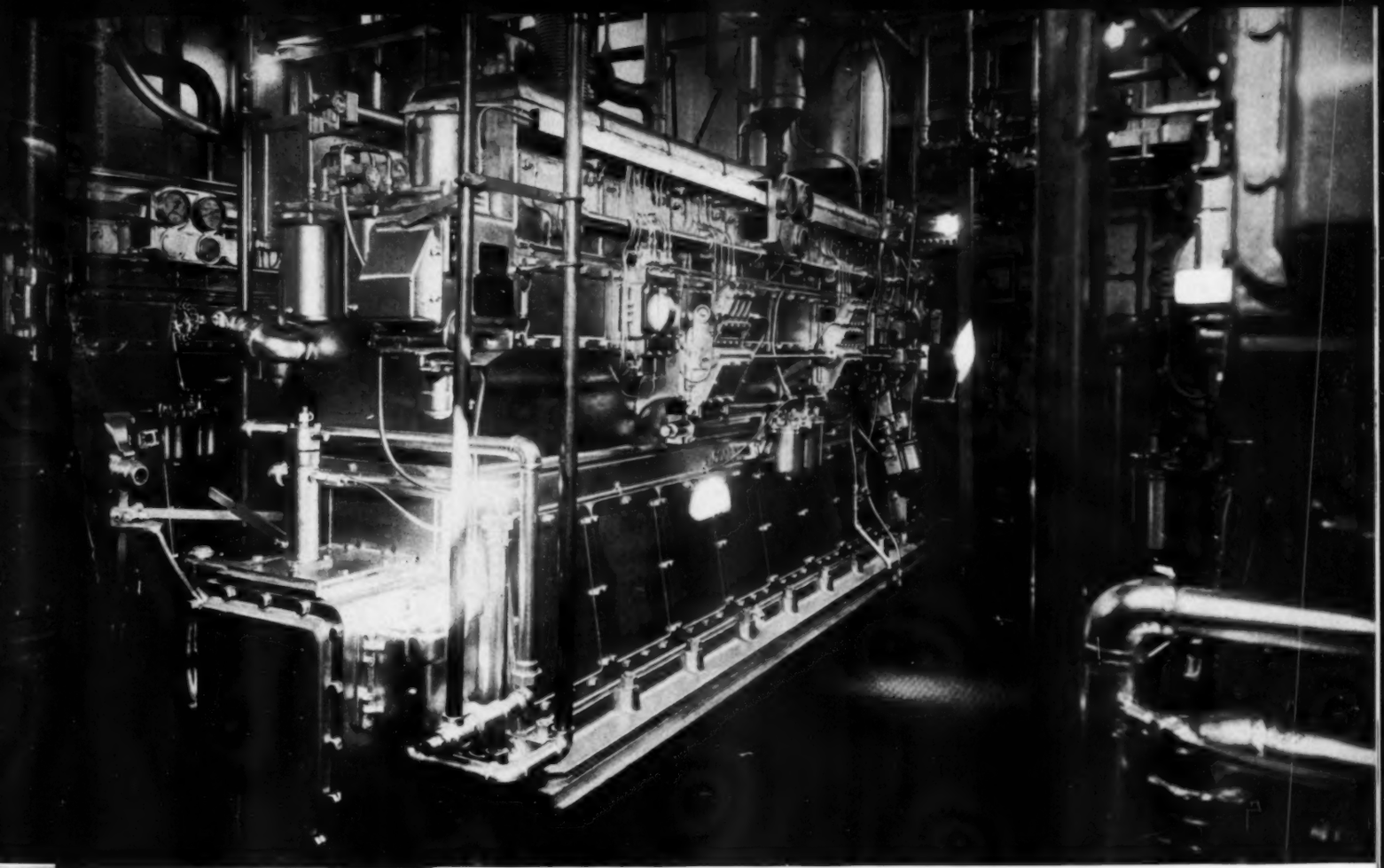
ELSEWHERE in this issue of DIESEL PROGRESS are mentioned the extensive shipbuilding activities at Sturgeon Bay, Wisconsin. An outstanding example of one of the types of vessels being turned out by Sturgeon Bay's busy shipyards is the *Anker L. Christy,* Diesel flagship of the Pure Oil Steamship Company river fleet, and a product of the Sturgeon Bay Shipbuilding and Drydock Company. She is the largest triple screw Diesel towboat in the United States, a marvel of modern design and construction and the pride of her designer, builders and owners. Named for A. L. Christy, executive vice-president of the Pure Oil Steamship Company of Detroit, Michigan, the *Anker L. Christy* was designed by A. M. Deering, naval architect of Chicago.

Three Cooper-Bessemer, 8 cylinder Diesels of 400 hp. each at normal operating speed of 430 rpm. turn three cast steel propellers. No less than seven rudders, four forward and three aft of the propellers combined with her 1,200 hp., give this great inland waterways towboat the power and dexterity so necessary to cope with tricky river currents with 482 feet of heavily laden barges "on her nose." And her operators say she is sure doing a grand job of it. The main Diesels are 10½" bore, 13½" stroke, direct reversing marine units using steel tie-bolt

construction. The power stresses are carried by steel tie-bolts which extend from the tops of the cylinder heads through to the bottom of the main-bearing anchorages. Thus, cast sections of the centerframes and cylinder blocks are constantly in compression. The cast sections are of Meehanite Metal. Power cylinder liners are bolted to the heads by means of separate studs, which is made possible by the tie-bolt construction. The maneuverability of these engines is a function of the constant-pressure atmospheric-relief fuel system. This constant-pressure atmospheric-relief fuel system relieves the fuel pressure on the injection nozzles to atmospheric pressure between each injection, which eliminates fuel nozzle dribbling or leakage and results in excellent flexibility. Nowadays it is all-Diesel or nothing, so, in addition to her three main Diesels, the *Anker L. Christy* is fitted with two Buda-Lanova Diesel auxiliaries driving 25 kw. Burke generators. Her engine performance indicating equipment includes six individual Weston electric tachometers, three for each main engine at the engineer's station as well as three in the pilot house and an Alnor multipoint pyrometer. Engine cooling is accomplished with a closed, fresh water system using the now accepted skin cooling arrangement.

Measuring 108′ overall length, 30′ molded beam, and 10′-6″ depth, the vessel is of all welded steel construction and embodies the newest of design and equipment features. Her texas deck is surmounted by a retractable pilot house which is actuated hydraulically to permit passage under low bridges. Her quarters are luxurious to the standard of first-class hotel accom-

The "Anker L. Christy," with her three Diesels driving triple screws and her seven rudders, gave a large group of newspaper and magazine men many thrills on trial runs.



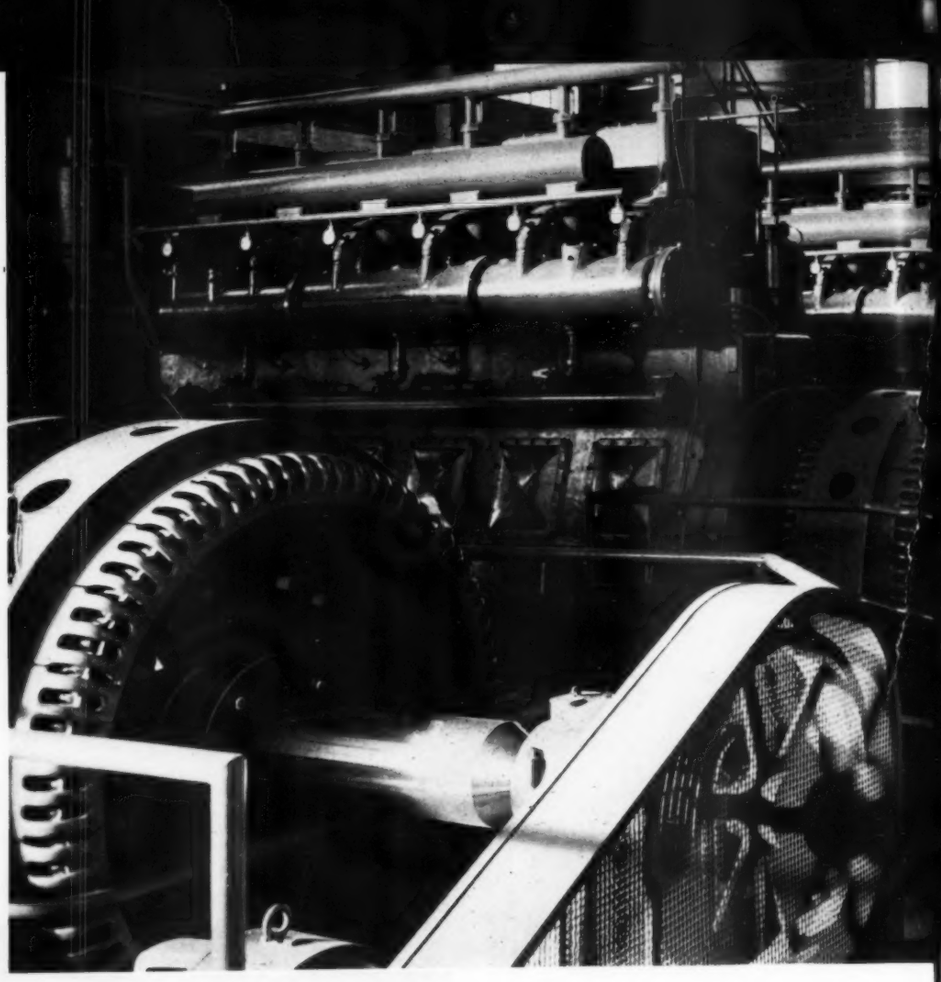
Three Cooper-Bessemer, 8 cylinder, direct reversing marine Diesels of 400 hp. each, swing three propellers which with seven rudders give this craft excellent maneuverability.

modations, the only concession to marine tradition being the bunks in the double staterooms provided for officers and crew. Appointments are highlighted by white enamel wall finish, large windows with Venetian blinds and blue drapes, chromium chairs, leather upholstered, telephone, and electric fan. Four double cabins, two port and two starboard, are on the maindeck forward with the upper engine room aft of these. Next aft are two more double cabins with full accommodations, part of which is a combination lounge and library and to starboard a pantry with a 32 cu. ft. G.E. refrigerator.

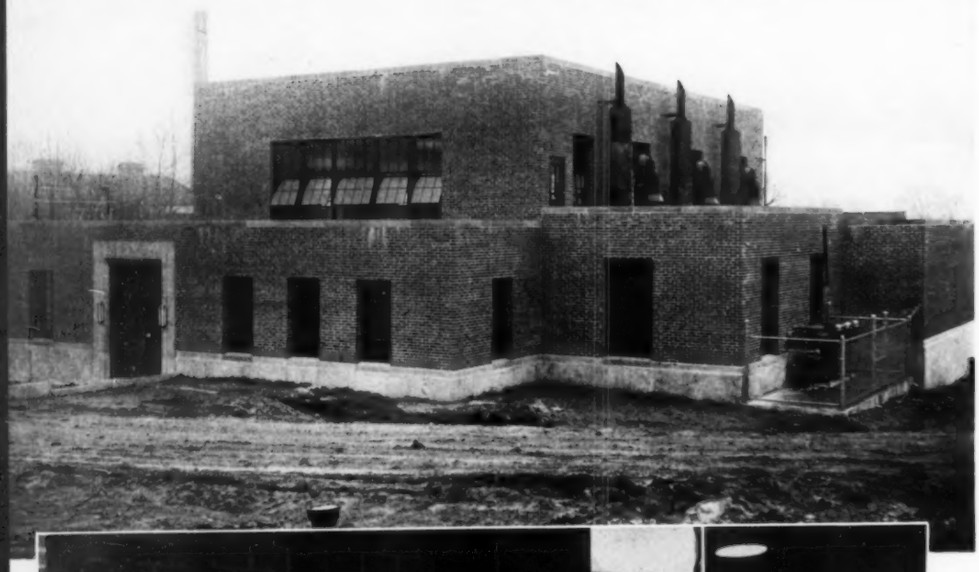
The galley and messroom are located in the extreme after end of the deck house. The forward texas houses the skipper's and owner's double staterooms. In the pilot house are controls for the three main Diesels, rudder controls, inter-communication system and ship-to-shore radio telephone. The control panel is adapted from airliner instrument panel design and receives illumination from an ultra-violet ray source which gives so called "black light." She carries a work boat, or tender, powered with a 50 hp. Gray marine engine and equipped with a radio of 50 miles range. Sanitary pumps, valves and plumbing throughout are Crane products.

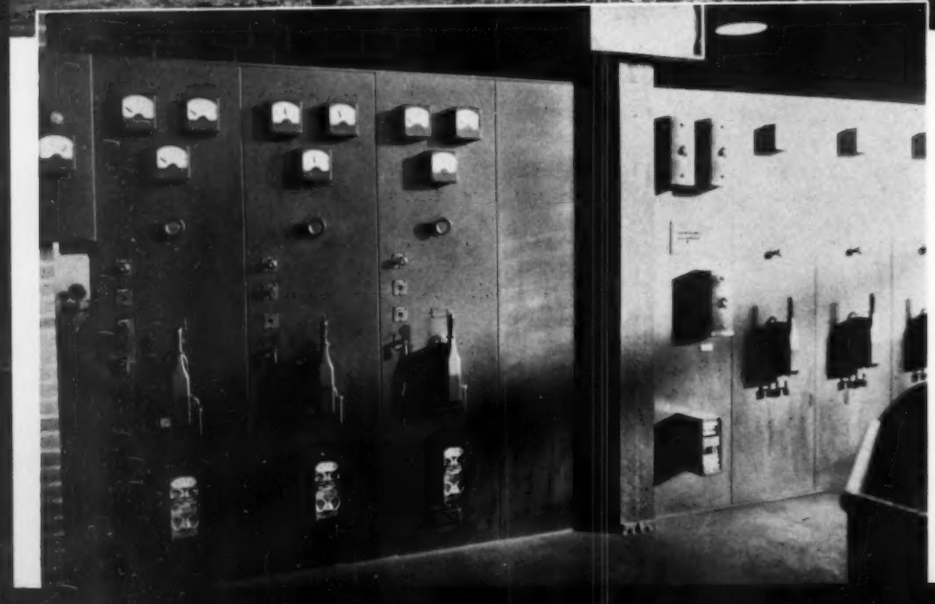
The *Anker L. Christy* is now in regular service on the Mississippi, Illinois, and Ohio rivers. With three barges carrying a total of 24,000 barrels or 1,680,000 gallons of gasoline tight against her rubber-faced towing knees, the overall length of barges and towboat is 590 feet, just ten feet less than the river locks. So loaded, she carries enough fuel for the trip from Port Neches, Texas, where Pure Oil's Smiths Bluff Refinery is located, to Minneapolis—against the current all the way.

Gone are tall smoke stacks of yesteryear's river craft. Engine exhausts are carried out through three low, oval funnels that look more like streamlined deck houses. She is painted in gleaming silver with blue trim—Pure Oil colors, and most fitting for the fine craft that she is. Such is the transition from smoke and fire-belching river steamers to clean, quiet, and efficient Diesel ships that are winning new converts daily along the great inland waterways of this country.



Right: Three Worthington Diesels and Elliott generators went on the line at Carrollton, Missouri, last year and made real money for the community in the first months of operation. Below: Exterior view of the new Municipal plant showing three Maxim exhaust silencers and American Cycoil air filters. Bottom view shows the switchboard built by Atkinson Armature Works.





NEW DIESEL PLANT PRODUCES IMMEDIATE PROFITS

By BENNETT B. SMITH

CARROLLTON, Missouri, is a staid old town whose merchants and citizens have always been progressive but who have not gone off chasing rainbows. When a plan for the betterment of the town was proposed, it was weighed carefully from all angles before going ahead. This was true in 1940 when the matter of new Diesel light and water plant was proposed, the former having recently been completed and put into operation. Only a few months old the plant is a paying proposition and the citizens are more than pleased with their investment.

For many years, Carrollton has secured both its lights and water from a Kansas City corporation. While the service was good, the town found there were little conveniences that other towns with their own plants enjoyed which they did not have. Then, too, Carrollton was paying the corporation some $16,000 yearly for service and was running a deficit.

The twenty-year franchise granted the corporation was coming to an end and a committee was appointed from the city council to look into the matter of providing a municipal plant. The citizens, learning of the move, put pressure on the committee to carry out the proposal as soon as possible. Mass meetings were held and, in 1937, the council was petitioned to call a special election to vote bonds. This election, calling for bonds of $129,750 for the light plant and $90,250 for the water works system, was carried by a good majority.

In 1938, it became possible for municipalities to secure 45% of a project as an outright gift from the Federal Government through the Public Works Administration. Carrollton took advantage of this at once and made application for funds for light and water plants. The grant was made and the town accepted the Government's offer in October, 1938, but actual work began on December 21, 1940.

The improvements were divided into two dockets: one for the power plant and one for the water works, with an estimated cost of $149,000 for the first and $64,900 for the second. Additional investments were $118,500 for the electric distribution system and $80,000 for the water distribution system, giving a total investment of $412,400 when completed.

When the Federal Government pays 45% of the total cost of a project, it requires that all plans, estimates, and specifications be completed by competent men and that the city provide and deposit its share of the expense in special accounts. This was done and Burns & McDonnell Engineering Co., Kansas City, were engaged to prepare the plans and have general supervision over the construction. It is interesting to note that, with the completion of the work, ten main and eight sub-contractors had taken part. Credit is due City Engineer Elzie E. Steele and Robert F. Moore, representing the PWA, for their very efficient supervision of the work.

Carrollton purchased three Worthington Diesels of 500 hp. at 360 rpm. at a total cost of $81,619. Elliott generators of 352 kwh. capacity each were used giving a total of 1,056 kwh. Each unit weighs thirty tons and is mounted on a separate reinforced concrete base containing sixty cubic yards of concrete. Fuel pumps are built in and mechanical lubricators are from Manzel Brothers Co. On the roof of the building are located three American Cycoil air filters and three Maxim silencers. Each engine is equipped with a Pickering governor and an American Bosch injection system. One engine will almost take care of the load at present but two are used during the early evening. One is held as a standby.

The switchboard was installed by the Atkinson Armature Works at a cost of $6,125. This board contains frequency meter, volt and ammeter, synchroscope, governor control, annunciator, and voltage regulators for each unit, all furnished by General Electric.

Beginning the first of this year accurate records were kept and results for the first month were very good. During January, 15,963 gallons of fuel oil at .0508 per gallon were used or a total cost of $810.92. Water, still secured from the corporation, cost $52.26 and, with repairs of $15.30, the total operating expense for the month was $1,448.88 or .00734 per kwh. Total cost of production was $2,369.55 or .012 per kwh. There were 197,100 kwh. generated.

The city hall Christmas lights carried into a part of January, and other free service amounted to $166.15. Total revenue for the month was $6,731.90; net income was $4,362.35. Revenue per kwh. was .042. Kwh. per gallon of fuel oil was 12.7. Records of engine operation are as follows: Engine No. 1 ran 220 hours, No. 2 ran 521 hours, and No. 3, 436 hours during the month.

The water system, which has also been owned by the same corporation, has been purchased, is just being repaired, and taken over by Carrollton. Water comes from several deep wells provided with two turbine type pumps capable of pumping 350 gallons per minute each. Water will be carried from these wells to the new light plant building where it will pass through Zeolite beds to soften the water. Required chemical treatment will also take place here and the water will pass to the 250,000 gallon clear well. High service pumps will deliver water from the clear well to the mains and water tower so that more than half a million gallons of water will be available at all times.

The plant was dedicated on October 27, 1941, with most of the citizens turning out to hear the program and to inspect the new plant. Mayor Harold M. Austin made the dedicatory address and presented the plant to a Board of Public Works composed of A. C. Smith, chairman, D. S. Ashbrook, H. J. Wilcoxson, and Walter Morrison, who will operate it for the citizens. Bands played and everyone was happy. The day closed with a banquet at night for those who had been closely associated with the planning and construction of the project.

And so, Carrollton is proud of its new utilities. Last Christmas thousands of colored lights decorated the business section for they could be furnished without direct payment to an outside concern. A thousand lights were claimed for the outside of the courthouse alone and were hung in strands. Street lights are now free and the town is well lighted.

FAMOUS "MAYFA NVE

FROM STEAM ESEL

By HENR EPHEN

As the implications of World War II become clearer, the symbol of our national freedom takes on new meaning and is the object of increasing daily pilgrimages, according to the Sutton Line, operators of the good ship "Mayfair" recently converted to Diesel propulsion.

THE statue—probably America's greatest sight—has been, from the time of its erection and particularly during our Defense Program, a daily thrill to traveler, expatriate and emigre alike. Today, however, with our country actually embroiled in war with the Axis forces and spare time being increasingly spent along patriotic lines, this symbol of liberty gains new significance. Visitors in 1941 set a record, passing the 445,000 mark early in December. In all of 1940, only 395,633 visited the monument. For a great many years, of course, this historic and delightful trip has represented the climax of a visit to New York by those in the outlying districts of America, as well as visitors from every section of the globe. The Battery Seawall in New York City, itself an interesting place with a commanding view of the harbor, is the port for this white vessel *Mayfair* plying between the wall and the statue. Let's see how Diesel came into this picture.

Probably the most famous of these statue boat lines has been and is the Sutton Line, and the *Mayfair* has been chartered to her by Mr. Guy H. Moon who has spent a lifetime in the excursion field. The *Mayfair* Dieselization is but one step in Mr. Moon's full program of vessel improvements to make these excursion trips even more comfortable and pleasureable.

The record of the *Mayfair* reaches back over sixty years, and includes service as a Government Lighthouse Tender, then named the *Pansy*. Due to her age and other factors, Mr. Moon gave a great deal of thought prior to converting the *Mayfair*. The usual success achieved, however, with similar Diesel-driven boats led Mr. Moon to select twin 320 hp. Fairbanks-Morse Marine Diesels of 8-cylinders each at 400 rpm. The selection of Marine Diesel equipment for this service has never

Typical cr the "Gra "Mayfair."

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The *Ma* Morse D *Madiso* years, pr had two *Mayfair,* sumed sc the price fuel expe

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Typical crowd awaiting passage to the "Grand Old Lady" on the "Mayfair."

Replacement of steam machinery with this pair of F-M Diesels leaves large working space in the engine room, and saves over $16,000 a year in fuel cost.

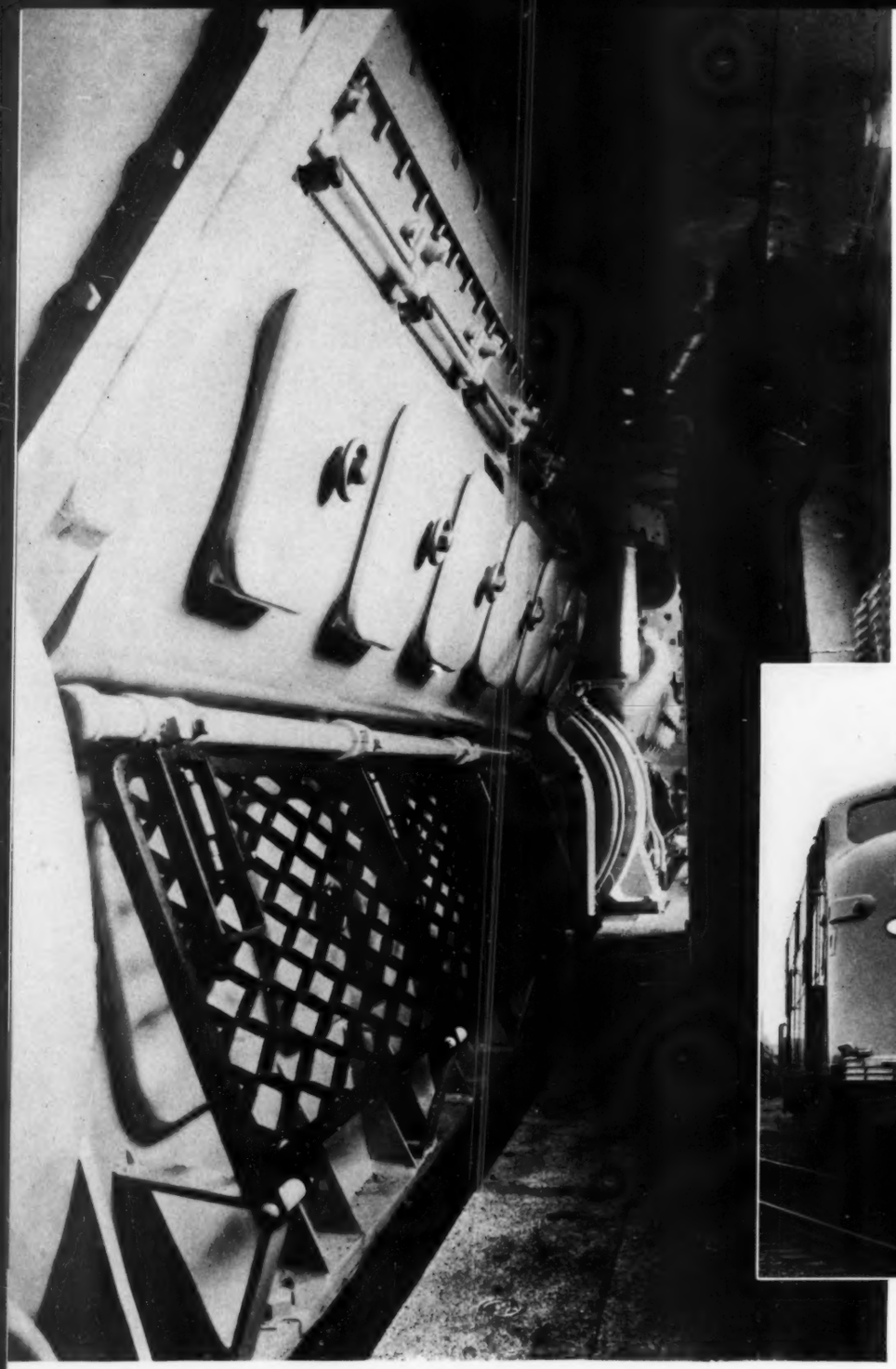
caused a moment's regret and today Mr. Moon says, "If I had to do it again, it would be exactly the same choice."

The *Mayfair* replaced another Fairbanks-Morse Diesel-driven boat making this run, the *Madisonville*, that was utilized for four years, prior to her purchase by the Navy. She had two 180 hp. F-M Marine Diesels. The *Mayfair*, however, was steam-driven and consumed some 7½ tons of coal daily, which, at the price then of $7.00 a ton, made a daily fuel expense of $52.50.

Opposed to this, the operating figures disclosed by Chief Engineer, J. A. Wells, show that the *Mayfair* uses about 129 gallons of number 3 standard fuel oil during her operating day, which runs from 8 a.m. to midnight. Texaco lube oil is utilized and 300 gallons were put in when the *Mayfair* originally went into service at the beginning of September, 1941, since when only 100 gallons has been added. This lube costs approximately 40c per gal. Figuring the fuel oil at .0475c per gallon, it is apparent that there is a daily operating cost for fuel and lube of about $6.50. The net savings, therefore, run $46.00 a day, or over $16,000 a year.

The F-M Diesels are installed aft of the engine room bulkhead with Maxim silencers and an Exide 32 volt storage battery. A service speed of fifteen miles was needed as the boat makes four landings per hour and her longest run never exceeds 12 minutes. She must, therefore, attain full speed quickly and for this service simplicity and dependability are prime factors. The *Mayfair* has a length of 144 feet, a breadth molded of 25 feet and depth of 10 ft. 6 in. Her three decks and quarters are unusually spacious, complete with safety and health appointments beyond the required amount. All on board from her skipper, Captain McHorney, to Chief Engineer Wells and Assistant Chief Mizell, are warm in their praise as to both the efficiency and savings the Marine Diesels brought about.

Today, more than ever, with thousands daily crowding to visit the "Grand Old Lady", efficient and profitable operation becomes a necessity and has been strikingly achieved with the latest in Marine Diesel equipment.



The two General Motors 1,000 hp. Diesels installed in the two-unit power unit are seen here.

FIVE of the most beautiful streamlined trains ever built and five new 2,000 hp., 117 mph. Diesel locomotives — thirty-five cars and five single-unit Diesel locomotives costing almost $4,500,000—have been added to the fast-growing fleet of the Chicago, Northwestern Railroad, progressive 10,000 mile system serving a vast area in the North Central heart of America, lying West and North of Chicago.

All in one day in the middle of January, these five magnificent trains began serving five major Northwestern routes, as the "400" Streamliners, companions to the giant pair of 4,000 hp. Diesel Twin Cities "400" trains, pioneer high speed day trains in America.

Power units for the "City of Milwaukee" a streamliner leaving Chicago's Northwestern Sta lley" "400"

STREAMLINERS FOR THE NORTH COUNTRY

By CHARLES F. A. MANN

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Built neatly around one of the real success stories of American fast day-train development, the new fleet of "400" trains fit into the pattern started one day back in 1935 when the Northwestern System, sensing the imperative need of ultra-rapid passenger train service between Chicago and St. Paul-Minneapolis, proceeded to yank the throttle on its splendid steam locomotives that were to haul a quickly refurbished fast afternoon train each way between Chicago and the Twin Cities.

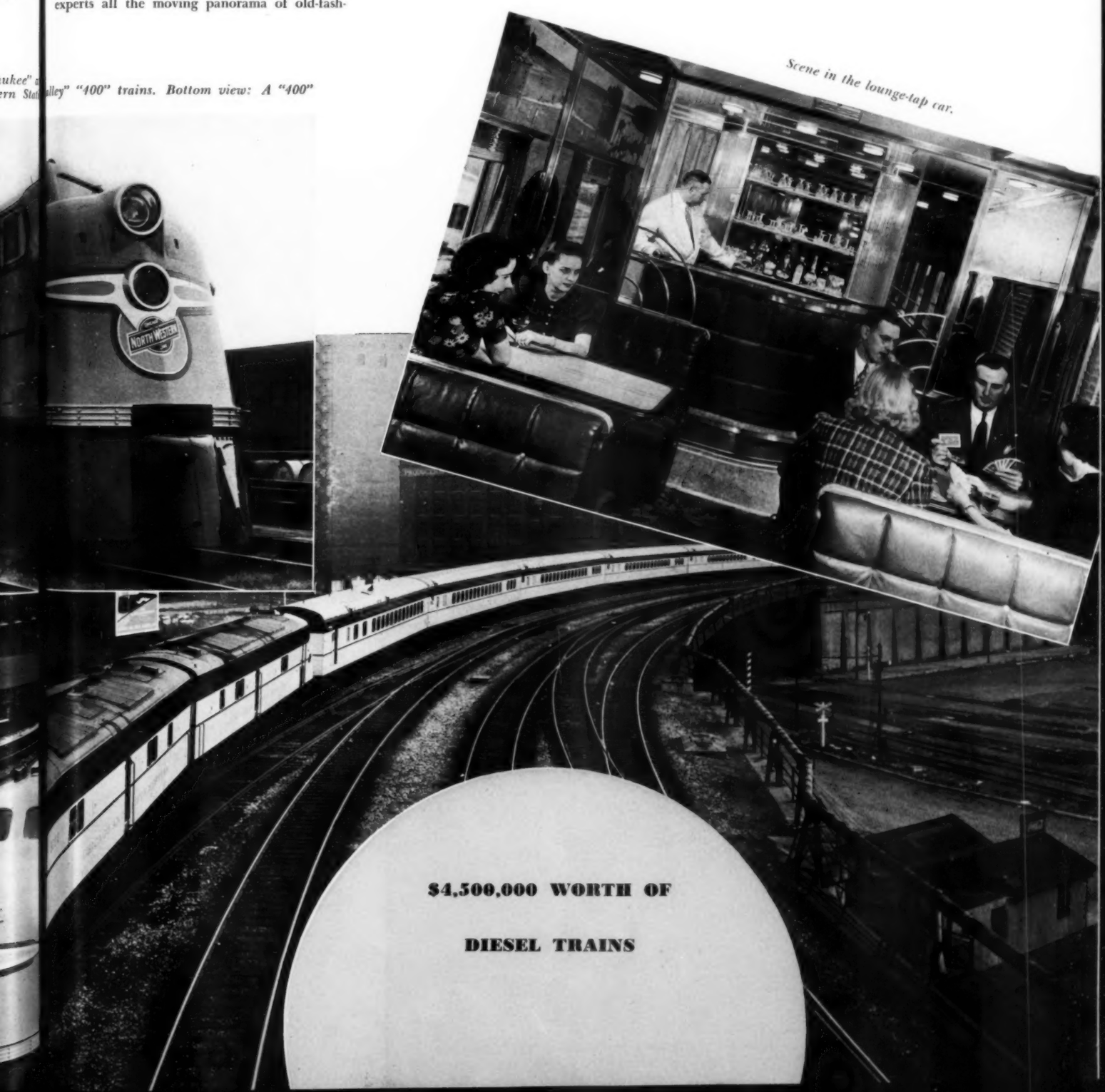
The epic battle to keep the "400" at the forefront of a three-cornered railroad race for this lucrative business has given American railroad experts all the moving panorama of old-fashioned steam power, new high-wheeled, high pressure steam, coal fired and oil fired, and. finally, Diesel streamliners winning the race, all in a short space of six years. It was the Northwestern that proved to hard-boiled, recalcitrant railway managers, who worshipped at the fountain of steam power, that Diesels actually increased the box-office on PASSENGER TRAINS, which no complex logic would disprove. The five new streamlined "400" trains extend the Diesel pattern of lightweight, high-speed deluxe trains North toward Green Bay, Wisconsin, and Ishpeming, Michigan, on the shores of Lake Superior; up Fox River Valley, past Oskosh, Neenah-Menasha, Fond du Lac and Appleton; on the Chicago-Milwaukee-Madison triangle run; on two high speed Commuter runs to Milwaukee and far out at Wyeville, junction with the Chicago Twin Cities "400," a long newly Dieselized extension-connection brings the flashing yellow and green Northwestern streamliner trains to Rochester and Mankato, in Southern Minnesota.

About 2,500 new daily Diesel miles have been added. Schedules cut from thirty-five minutes to nearly three hours; luxurious train service to

. . . *And now please turn to page 55* . . .

Scene in the lounge-tap car.

alley" "400" trains. Bottom view: A "400"



$4,500,000 WORTH OF

DIESEL TRAINS

YOU OUGHT TO GO TO PEORIA!!

The Diesel Convention Opens There June 17

THE annual Diesel Convention will be held this year at the Pere Marquette Hotel, Peoria, Illinois, June 17 to 19. Possibly it will be better known to many of you as the Oil and Gas Power Division of the ASME annual meeting, but we prefer to call it the Diesel Convention, which it really is.

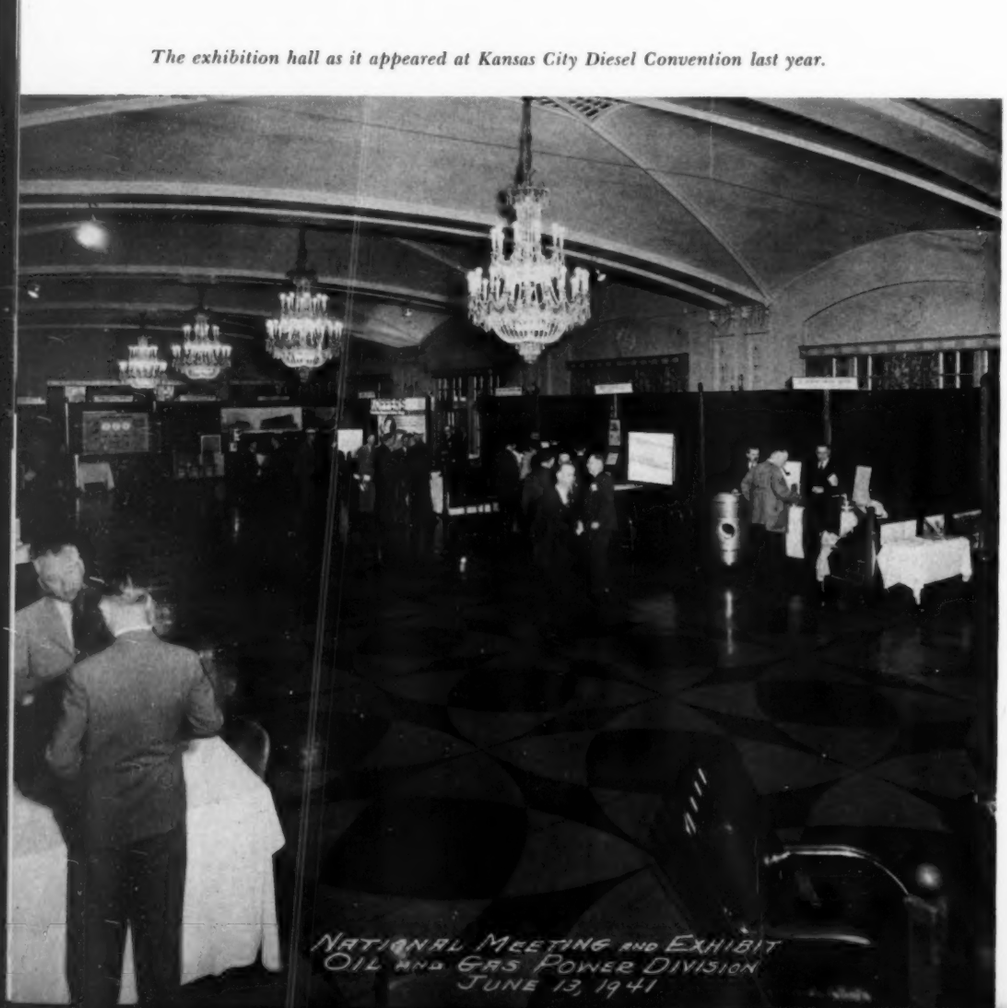
The tentative program, and it is quite tentative at this writing, calls for registration at 10 o'clock on Wednesday, June 17; for a general luncheon at 12 o'clock; for a session on "Diesel Engine Design," starting at 2 o'clock. The lead-off discussion will be given by A. B. Willi, Federal-Mogul Corporation, on the "Design of Sleeve Bearings." This will be followed by a talk by Prof. T. J. Dolan of the University of Illinois on "Factors Influencing Loads on Bolted Connections," and then the windup paper will be by R. W. Young, Chief Engineer, Wright Aeronautical Corporation, when he will describe and show illustrations of the Mercedes-Benz Aircraft Engine. The day will close with a "Get-Acquainted" buffet supper, commencing at 6:30.

On Thursday, the meeting will open at 9:30, and Glenn C. Boyer of Burns & McDonnell Engineering Company will lead off with a discussion of "Design of Internal Combustion Engine Power Plants," followed by Charles Keane, Great Lakes Pipeline Company, discussing "Pipeline Pumping Stations," and the morning meeting will close with J. W. Bostwick of Fairbanks, Morse & Company outlining "Developments in Closed Cooling Systems." At 2 P. M. on Thursday, there will be a round-table discussion on "Operations and Maintenance under Wartime Conditions," at which time leading operators and service engineers will contribute their personal experiences.

Thursday night, the Annual Banquet, which is strictly informal, will commence at 7 o'clock in the ballroom of the Pere Marquette Hotel. On Friday, the opening of the meeting is scheduled for 9 o'clock and Troels Warming of Nordberg Manufacturing Company will start off by discussion of "Power Pulsations Between Synchronous Generators." This will be followed by Dr. E. W. Landen of Armour Research Foundation, with the assistance of Dr. L. A. Blanc of Caterpillar Tractor Company, in a discussion of "Instrumentation in Study of Diesel Combustion." Then F. P. Grutzner of Fairbanks, Morse & Company will talk about "Heat Recovery Possibilities of Diesel Engines," and Prof. P. H. Schweitzer of Pennsylvania State College will show some interesting results of his experiments on "Excess Air and BMEP." The meeting will wind up with a talk by Prof. H. M. Jacklin of Purdue University on a "New Two-Cycle Engine."

On Friday afternoon, Caterpillar Tractor Company has invited the entire Convention to witness a demonstration of Diesel-powered earth-moving equipment at their proving grounds and they will serve at 5:30 an old-fashioned Illinois Fish Fry on the proving grounds. All in all, this is an important, interesting Convention and we urge you to attend. Reservations should be made immediately with the Pere Marquette Hotel at Peoria for such accommodations as you require but please mention that you are attending the Diesel Convention and special consideration will be extended to you.

The exhibition hall as it appeared at Kansas City Diesel Convention last year.



List of Exhibitors at the Diesel Convention, Peoria, Illinois June 17-19

Space	*Exhibitors*
1	—Detroit Lubricator Company
2	—Wausau Motor Parts Company
3	—Synchro-Start Products, Inc.
4	—Maxim Silencer Company
5	—American Hammered Piston Ring Div.
6-7	—Aluminum Company of America
8-9	—American Bosch Corporation
10	—Aircraft & Diesel Equipment Corp.
11	—Nathan Manufacturing Company
12	—Diesel Engineering & Mfg. Corp.
13	—Sperry Products Company
15	—Burgess Battery Company
16	—Briggs Clarifier Company
17	—Commercial Filters Corporation
18	—Lovejoy Flexible Coupling Company
19	—Honan-Crane, Inc.
20	—Korfund Company
21	—Wilkening Mfg. Company
22	—American Air Filter Company
23	—Metallizing Company of America
24	—Illinois Testing Labs., Inc.
25	—Hilliard Corporation
26	—Elliott Company
27	—Scintilla Magneto Div., Bendix
28	—DeLuxe Products Corporation
29	—Penn Electric Switch Company
30	—Caterpillar Tractor Company
32-33	—Niagara Blower Company

OPERATING CONDITIONS

By R. L. GREGORY*

DURING the past few weeks this department has received several communications discussing various phases of Diesel operation. Because there are so many different designs of Diesels, the conditions which influence operation are legion. Hence, this subject can only be discussed in a general way.

Whether you are operating a Diesel in automotive work, on a ship, in an industrial plant or a generating station, there are certain phases of operation applicable to all units. This phase has been discussed in previous articles but is one of greatest importance. Up to the time that this country became the Arsenal of the Democracies, Diesel design and manufacture had become pretty well stabilized. We are now, however, entering a new phase in this matter.

Heretofore many of the manufacturers secured certain parts of their units from foreign vendors. Materials and metals were plentiful and the product as placed on the market was the result of years of study and research. Now it is an entirely different picture. With rationing, priorities, substitutes, etc., many units will be placed in the field with parts which have not been as thoroughly tested as previously. This is going to throw an additional burden on the supervisory and operating personnel, since it will be up to them to watch their units and ascertain whether these new parts, made of substitute materials, will stand up after a period of operation, as the old material did. Hence, you who are operating these later units may have to give greater attention to your maintenance, until you are convinced that the substitutes will do the work. Just as an example of this let me take the situation of valves and valve seats. In pre-war units, these were generally constructed of a high-grade chrome steel. Today many of them are being made of a common grade of steel, for chrome is not available in as plentiful amounts as it was and this metal will probably become scarcer as the war wears on. Now perhaps with valves made of common steel, they will bear closer attention and will not stand the hours of service that your other valves did. This is just one phase of the picture.

Those likely to be more affected than anyone else are units applied to the automotive industry. Large stationary, slow speed units are not subjected to the strain and stresses as are Diesels used in the automotive industry.

Another feature that will have to be watched is lubrication. With substitute materials, you may have to change your lubricant. In any event, the mechanical condition of your units must receive first-class attention and, as time goes on, your repair parts will be made of different materials, which when installed will require close observation until they have been thoroughly tried and tested to avoid costly shutdowns.

Great care should be exercised in starting a unit. It is bad practice to race it from a cold start, since it results in poor combustion and we are all aware of the effects of poor combustion on the mechanical parts of the unit. This is particularly true of high speed units, and operators should form the habit of properly starting and warming up the unit. We all know that we can operate a unit at idling speed and warm it up much better than you can by racing it. Watch the cooling system and see that it is functioning properly and that your unit is properly warmed up before throwing on the load. Keep the cooling system clean.

Overloading is another point of vital importance, and operators and engineers should thoroughly familiarize themselves with this point. Due to the design of a Diesel, it is a constant torque machine and often units are overloaded because the operators do not understand this point and unintentionally overload them. A Diesel properly designed and maintained will operate efficiently for long periods if these operating conditions are closely watched. The load which a Diesel will carry depends upon combustion, and the most efficient point is that of complete combustion which means the proper mixture of air and fuel. An excess amount of fuel or a lack of air will cause smoking at the exhaust. Diesel injection equipment is so designed that more fuel can be admitted than the air present will completely burn, in order to allow the unit to take on temporary overloads. This will not injure the unit if not carried on too frequently. If you make it a practice to overload your unit, however, you are operating under a condition of incomplete combustion, with its attendant damage to mechanical parts as well as interfering with proper lubrication and loss of efficiency.

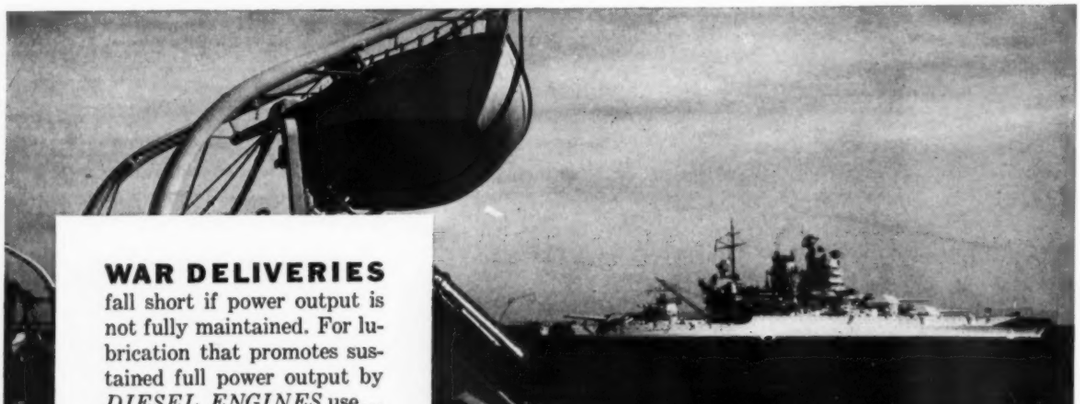
Great care should be exercised in keeping your unit at the proper operating temperatures. Excessive operating temperatures, caused by overloading, improper control, and functioning of the cooling system with lack of vigilance on this point will cause trouble.

The lubrication should be carefully watched because, through the medium of proper cooling and lubrication, the heat caused by combustion can only be properly dissipated.

The foregoing points are those to be watched and this is esepcially true for at least the duration. Individual operating conditions will have to be studied and properly adjusted in order, to get efficient results.

When replacement parts are installed, look them over carefully to see that they are correct, and, when you find substitutes in both materials and designs, give special attention to these parts until you are entirely familiar with any changes which they may cause in your otherwise routine operating conditions.

* *Chief Engineer, Municipal Water and Light Plant, Hillsdale, Michigan.*



WAR DELIVERIES fall short if power output is not fully maintained. For lubrication that promotes sustained full power output by *DIESEL ENGINES* use...

. . . . . SINCLAIR RUBILENE OILS. They provide a long-lasting lubricating film and avoid sludging and corrosive tendencies in severe continuous operation.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.

FAIRBANKS-MORSE *Diesel in Municipal Light and Power plant, St. Louis, Mich. Lubricated for over 4 years with Rubilene Oil Medium.*

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE NEAREST SINCLAIR OFFICE

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Streamliners for the North Country

. . . . *Continued from page 51* . . . .

out-run buses and planes brought to an area almost as large as all of Northern France and, now, there are fifty-eight weekly Diesel trains in and out of Chicago's famous and very sooty Northwestern Station, probably boosting this second only to Washington, D. C., Union Station as America's No. 1 Diesel railroad terminal.

Pullman built, the thirty-five magnificent cars are from a mid-ground between very lightweight and modern "heavy" type construction. General Motors furnished four of the 2,000 hp. Diesel locomotives, equipped with its standard 12-cylinder V type, 1,000 hp. Diesel engines, a pair to each locomotive. Six wheel roller bearing trucks, the latest in safety and comfort gadgets for the engine crew, a large Vapor-Clarkson heating boiler, fuel for 500 miles running in warm weather, and about 400 miles in one of Wisconsin's frigid wintry blasts. American Locomotive furnished an identical duplicate 2,000 hp. Diesel locomotive to that of the original Santa Fe Alco passenger machine with two 6 cylinder, 1,000 hp., 4 cycle supercharged Diesels and practically the same supplementary and auxiliary equipment and devices as to be found on the General Motors model. Even the exteriors are similar, except the nose of Alco's loco is shaved off bluntly, which gives a nice cigar box contour over the windshield.

The trains each consist of a 2,000 hp. locomotive; one combination lunch-taproom-baggage car; one diner with 56 seats; three coaches and one parlor car with drawing room. Daily variation in load may add two or three daycoaches to the consist. The coaches seat 56 with 8 more in luxurious smoking rooms; the diner 56; the tap-lunch counter 25; the parlor cars 30 with an extra 5 in the drawing room. The entire fleet of cars averages within one inch of being exactly 82 ft. 5 inches in overall length, and each car is a unit all by itself. There are no articulated coaches on the entire Northwestern layout, except on some of the original Union Pacific-Northwestern streamliners.

A story in sound engineering, high return on invested capital, popular and increasing public reception to beauty, speed, and comfort, and a lesson in railway economics, all achieved by extension of proven lessons learned in operating fast daily Diesel mileage. And the telegraph advises us the Midwesterners are standing in line with cash for tickets. Traffic up 25% in first week of operation.

MAINTENANCE IS NO PROBLEM

Arranged to be operated from either of two 1050 H. P. Diesel engines, the shaft generator is driven by Diamond Roller Chains at 1200 r.p.m.

Diamond Chain Generator Drives Require Little Attention

● Smoothly and quietly Diamond Drives run on and on with only occasional attention to the oilers. They eliminate the usual maintenance, the periodic taking up for stretch, the delays and expense of replacements.

Consisting of a series of hardened steel roller bearings, rolling at every point of contact,—they transfer power quietly without slip, creep, or stretch,—with so slight loss of power that it is impossible of measurement. And they hold this practically 100 per cent efficiency through long years of useful maintenance-free life.

Diamond Drives transfer power equally well over short or long center distances,—hold to 100 per cent speed ratio, and require little space per horsepower. During our 52 years of developing and manufacturing the one product—roller chain—there has been practically no type of drive to which it has not been adapted.

This long experience and the recommendations of our specialized drive engineers are at your service. Save time by letting us cooperate with you. DIAMOND CHAIN & MFG. CO., 407 Kentucky Avenue, Indianapolis, Indiana. Offices and Distributors in All Principal Cities.

DIAMOND ROLLER CHAINS

"The nation now, as in 1917, will need the wholesome tonic of recreational travel as one of the greatest maintaining forces of national morale."—Statement by United States Travel Bureau of the U. S. Department of the Interior.

★ ★

WE'RE DOING

Our Part...

★ ★

HOTELS OF SOUTHERN CALIFORNIA are doing their part in this great national cause by maintaining normal facilities and operations in every department for the use of Americans seeking mental and physical release from strain and fag.

To facilitate the business of Americans, and in the interest of war production, there is augmented service at the great metropolitan hotels of Los Angeles, Hollywood, Long Beach, San Diego and other large cities of Southern California.

There are no rations of fun at the resort hotels located on the desert at Palm Springs; by the sea at Coronado, Carlsbad, Laguna, La Jolla, Santa Catalina, Santa Monica and Santa Barbara; and amid the beauties of Pasadena, Beverly Hills and Riverside. Health and energy still bubble from the earth at the famous mineral springs resorts.

Golf, tennis, riding, swimming, cycling, badminton and a multitude of other sports and recreations are still to be enjoyed every day of the year by the visitor to this sun-blessed land.

Hotel rates in Southern California will continue at pre-war levels. Nowhere is there a greater variety of hotel accommodations to suit every budget and every taste.

In spite of rumors, travel IS *normal in Southern California. Transportation to and throughout the state* IS *normal, and hotel and resort life* IS *normal.*

For further particulars, consult the nearest travel or transportation agent or your automobile club.

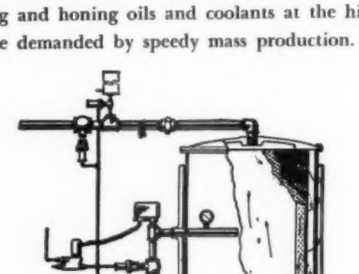
Hotels

of Southern California

Room 701, 629 South Hill Street, Los Angeles, California.

New High Flow Oil Clarifier for Cutting and Honing Oils

TO MEET the urgent need arising from increased grinding and honing operations in war production plants, Honan-Crane Corporation has built a new High Flow Oil Clarifier. This Oil Clarifier will remove abrasives from cutting and honing oils and coolants at the high rate demanded by speedy mass production.



Method of hooking up the Honan-Crane High Flow oil clarifier. Cutaway section shows path of oil through the unit.

The removal of abrasives from cutting and honing oils as fast as they are liberated insures better finishes and increased production. The cycle of operation of this clarifier is completely automatic and it is self cleaning. The unit is manufactured in three sizes having a capacity of from 60 gallons to 100 gallons per minute.

Write Honan-Crane Corporation, Lebanon, Indiana, for Bulletin No. 29.

West Coast Diesel News

THE fifth Fairbanks-Morse Diesel, a 4 cylinder, 700 hp., direct connected to F-M 603 kva., 3 phase, 60 cycle, 480 volt alternator and 150 kw. exciter, has been installed for the U. S. Gypsum Co., at Midland, California.

FIRST award of the Navy's "E" pennant to a California shipyard went to Basalt Rock Co., Napa, for record time completion of two Enterprise Diesel tankers. Westinghouse supplied the electrical equipment, Cummins the auxiliary Diesels, and Worthington the pumps and compressors.

THE 35-ft. tug *Warrior* of the Pacific Towboat Co., Ancortes, Washington, is sporting a Waukesha Diesel with Twin Disc gears and giving a good account of herself handling log tows.

RECENT Murphy Diesel installations include a 6 cylinder, 135 hp. engine in the New Eng-

land Fish Co's tender *Carlisle;* a 4-cylinder, 85 hp. engine in the halibuter *Shirley J;* a 160 hp. supercharged unit in the Puget Sound Tug and Barge Co's *Dellwood,* all in the Pacific Northwest.

THE San Francisco Bay tug *Alex B,* in charge of Captain Frank Smith and owned by the Bay Cities Transportation Co., is being repowered with a Caterpillar D13000 Diesel having a Twin Disc 3 to 1 reduction gear.

A LARGE number of Diesels have been installed in vessels operating on the Sacramento and San Joaquin Rivers, the latest being the Daniels Contracting Company's *Sally* which is getting a new 12″ x 15″ 300 hp. Enterprise.

INCREASED employment at the Vallejo, California, Navy Yard, is taxing the capacity of the Mare Island ferries and four more 65 footers are reported to be under construction for this service. As all boats in Ney Raahauge's fleet are Fairbanks-Morse Diesel equipped, the new ones will have 80 hp. Diesels of the same make.

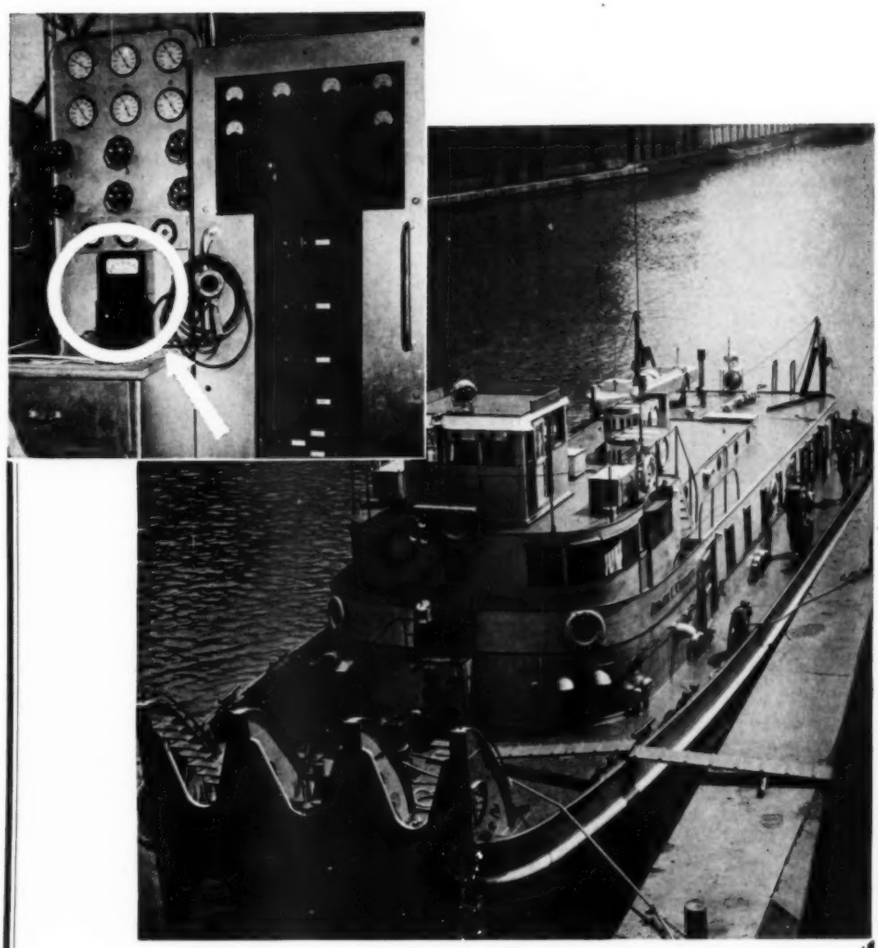
MONTGOMERY Fuel Co., Bellingham, Washington, purchased and repowered the 550 barrel lighter *Central II,* with a 100 hp. Caterpillar marine Diesel replacing a 300 hp. Diesel. Owners report the same speed with the smaller engine, 8.2 knots, with same tonnage.

THE 57-ft. salmon seiner *Wonderland* building for Paul Martinis by the Hansen Boat Yard, Everett, Washington, is powered with a 110 hp. Atlas Imperial Diesel engine. A duplicate boat for Vince Martinis with same power is also building.

REPOWER jobs for the Nakat Packing Corporation, Alaska, include four new Superior 90 hp. Diesels in native purse seine boats at the Waterfall cannery. These Diesels replace gasoline engines.

GRAY Diesels of 6 cylinders, 165 hp. and 4.41 to 1 Twin Disc gears have been installed in the 56-ft. cannery tender *Duncan 1,* McConaghy and Co., Kodiak, Alaska. Exide 32 volt batteries are part of new equipment.

COMMODORE, 129-ft. tuna clipper recently launched by the Campbell Machine Co., San Diego, California, is powered with a 450 hp. Union Diesel with two 200 hp. Diesels driving General Electric 125 kw. generators.



ALNOR protects the main Diesels on the "Anker L. Christy"

The "Anker L. Christy", flagship of its river fleet, is powered with three, 8 cylinder, Cooper Bessemer Diesels totalling 1,200 hp. An "Alnor" multipoint pyrometer, mounted on the gauge board at the engineer's station, shown above, gives accurate indication of performance in each of the 24 cylinders by means of the selector switch. Modern vessels deserve the best protection for their costly machinery—most new Diesel ships carry Alnor exhaust pyrometers.

●

Buy or specify "Alnor"
Ask for catalog

Illinois Testing Laboratories Inc.
Alnor Guards Know!
423 NORTH LaSALLE STREET, CHICAGO, ILLINOIS
Manufacturers of "Alnor" and Price Instruments—Products of 41 Years' Experience

THE 77-ft. combination cannery tender and seine boat, *Cavalcade,* under construction by West Waterways Shipyards, Seattle, Washington, is powered with a 250 hp. Atlas Imperial Diesel. An unusual feature is the installation of fuel tanks to form floor of fish hold.

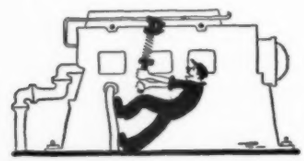
TWIN Gray Diesels have been selected to power the new Hanson designed Pacific Naval Air Base Contractors towing and supply boat to be built by the Reliable Welding Works, Olympia, Washington.

CATERPILLAR Diesel sales reported include: a D-8800 in the Islais Creek Boom Co's tug *Regal;* a D-4600 in the America Dredging Co's tug *America;* a D-13000 in the *P. G. & E. No. 4,* same company; and the same model in the *General Engineering No. 1* of the Hydraulic Dredging Co., all of San Francisco Bay area.

THE Marine View Boat Building Co., Tacoma, Washington, has installed a 240 hp. Atlas Imperial Diesel in the 80-ft. seiner for John Breskovich; and a 75 hp. Atlas in the 60-ft. halibut boat for John Odegard.

GRAY Diesel marine engine sales in Southern California include that of two four cylinder Diesels with 2 to 1 reduction gears to the Basch Ross Tool Co., Newport Harbor, for installation in their cruiser *Laura F.*

FAIRBANKS-MORSE Diesel sales division, Los Angeles, California, report the sale and delivery of an industrial 225 hp. at 300 rpm. Diesel to Bing K. Wong, Marana, Arizona. It will be used with Winthrop pumps on an irrigation project.

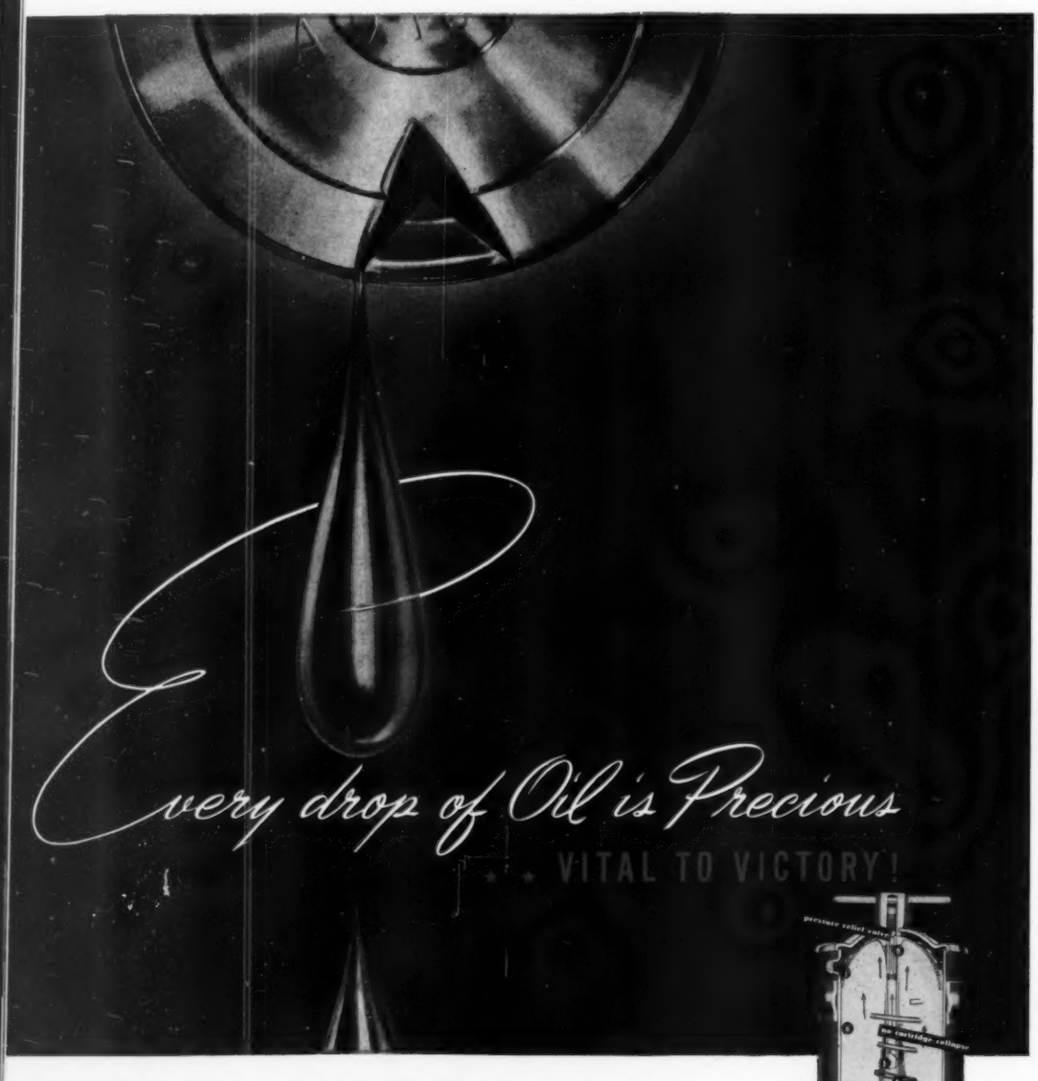


DEMCO Fuel Injection Equipment

THE Diesel Engineering and Manufacturing Corporation of Chicago announced its readiness to supply fuel injection pumps and injectors in a full range of sizes and types to the Diesel industry. The company is headed by Nicholas Fodor, President, Adam Gabriel, Vice-President, and A. M. Steelhammer, Treasurer.

Headquarters of Diesel Engineering and Manufacturing Corp., 200-214 N. Laflin St., Chicago.

Mr. Fodor's experience in Diesel engineering covers a period of twenty years, beginning at Fried.-Deckel, Munich, Germany, manufacturers of "COMPUR" fuel injection equipment, then with the famous Krupp Works, and later in this country with Allis-Chalmers and Diesel Engineering Company. He is in charge of fuel injection equipment design. Mr. Gabriel, in charge of production, is also associated with the Acme Industrial Company of Chicago, manufacturers of precision tools and gauges. The Diesel Engineering and Manufacturing Corp. now has fuel injection pumps and injectors in production for a radial Diesel and is equipped to design and build injection equipment for all sizes and types of Diesels.



SAVE MORE OIL

★★With a DELUXE OIL FILTER

★★ THE FILTER THAT MAKES OIL LAST ITS LONGEST!

No longer should there be any question about the need for an oil filter on every car, truck, bus, tractor and diesel engine in the U. S. A. Even the question of what kind of filter to install is answered when you check into DeLuxe's exclusive 8 point construction . . . check the fleet experiences with DeLuxe . . . check the records which show more fleets using DeLuxe than any other. Get the facts about DeLuxe today. Address DeLuxe Products Corp., 1416 Lake Street, La Porte, Indiana. In Canada: 364 Richmond Street, W., Toronto, Ontario. And remember that the fundamental reason for DeLuxe's superiority in making oil and motors last longer is that it

DOES MORE THAN STRAIN OIL ★ MORE THAN FILTER OIL ★ *ACTUALLY CLEANSES OIL!*

TO A FRIEND WHO THINKS THE GOING IS TOUGH

The Day Bataan Was Hit Hard

*By BILL ELLIOTT**

Says you, "The War is on—I'm out of luck,
Business conditions are sure getting bad;
A bearing burned out and a piston is stuck,
And no new repairs right now can be had."

Have you heard the news from Bataan just today
Where our boys choose to fight until they die?
And yet because things don't all come your way
You believe you should simply sit down and cry!

What did the Marines say, way out there on Wake?
Did they say, "Let us throw in the towel, we've been beat?"
No! they said, "Send us more Japs, we'll give all they can take
Till the Pacific Ocean is way up to our feet."

Those boys needed tanks, anti-aircraft, and such;
The Navy needs ships, guns and planes.
To run your small outfit you don't need so much.
Sure, we know what is needed causes you pains.

You say you need metals, tires and cement,
And you need lube oil, pipe, packing, glue;
But if you are short, don't just sit and lament.
Those boys went on fighting, why not you?

So get off of your hunkers and let's make her run,
And when someone mourns, "Gad she's broke down,"
Say "Come on—get going, we're not here for fun,
On Midway they didn't just quit and sit down."

Nor did they just quit when dead on their feet.
Although they were staggering, it was always ahead;
Nor when it got rough did they cry out, "We're beat,"
For, spirits like theirs won't be beat til they are dead!

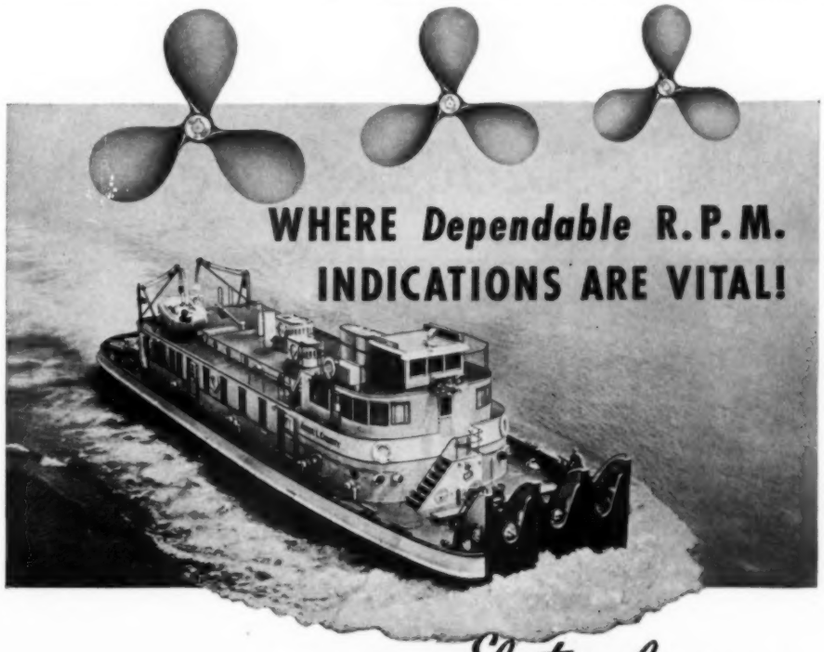
*Supt., Municipal Light & Water Dept., Vernon, Texas.

Montreal Locomotive Works, Ltd., Appoints Alexander M. Hamilton

WILLIAM C. DICKERMAN, Chairman of the Board of Directors of the Montreal Locomotive Works, Ltd., announced recently the election by the Executive Committee, of Alexander M. Hamilton as Executive Vice-President in executive control of the Canadian Tank Arsenal operated by the Locomotive Works, an affiliate of the American Locomotive Company.

Mr. Hamilton will be elected a member of the Board of Directors of the Montreal Locomotive Works, Ltd., at its next regular meeting in April. The other officers and staff will remain unchanged. William S. Morris remains as Vice-President in charge of Product Sales in Canada and William M. Townsend as Works Manager.

In 1915, Mr. Hamilton went to Russia as technical representative of American Locomotive Company. In that capacity he supervised the



Dependable *Electrical* indications are provided for all 3 engines on the Anker L. Christy

WESTON *instruments are available in various sizes and shapes, with scales calibrated in any range of r.p.m.*

It takes the *electrical* method of r.p.m. indication to meet the exacting requirements of triple-screw operation. For only the electrical method permits duplicate and remote indications... provides instant, smooth response to any change in engine speed ...assures the precise readings essential for agile maneuverability in river currents. And despite these advantages, installation is simpler, quicker, the electrical way. The three WESTON r.p.m. indicators in the engineroom, like the duplicate indicators in the pilothouse, were simply wired back to the small magnetos mounted on the three propulsion engines. For with electrical indication there is no flexible shafting to complicate installation...no gears or other mechanical wearing parts which too often result in lowered efficiency ... higher maintenance. Whether yours is a single, double or triple-screw craft, it will pay you to get all the facts on electrical r.p.m. indication. See your nearest WESTON representative, or write to Weston Electrical Instrument Corporation, 579 Frelinghuysen Avenue, Newark, New Jersey.

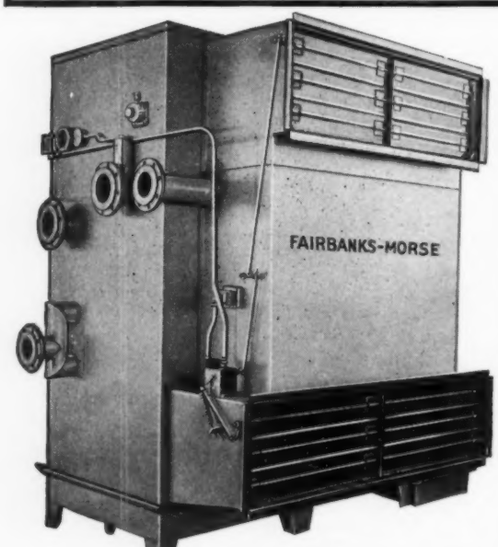
WESTON *Instruments*

erection of large orders of locomotives sold to that country by the American concern. After serving in the United States Army during the first World War, he was stationed in Paris as European representative of the Locomotive Company for its large foreign activities. In 1921 he was transferred to New York, serving as head of the Company's foreign business including sales, finances and foreign construction.

Mr. Hamilton was graduated in 1909 from Cornell University, Ithaca, N. Y., with a degree in mechanical engineering. He served an apprenticeship in the shops of the Erie Railroad and was later employed in the engineering department of Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa. He joined the American Locomotive Company in 1910, serving in the Schenectady shops, estimating and engineering departments.

Mr. Hamilton is a former president of the Export Managers Club of New York, is Vice-President of the American-Russian Chamber of Commerce, a member of the executive committee of the Mexican Chamber of Commerce, and a member of the National Foreign Trade Council of the U. S. A. He will make his home in Montreal.

Here's the Modern Way to Cool Jacket Water



FAIRBANKS-MORSE EVAPORATIVE COOLER

Type C, with full thermostatic control. Lube oil temperature is controlled independently of jacket water temperature. Other types provide for semi-automatic and for manual control.

● The new Fairbanks-Morse Evaporative Cooler, operating on a closed system, provides the *modern* way to cool jacket water.

This new Cooler takes little space — can be located in the engine room, right under the engineer's eyes. It operates efficiently . . . eliminates all possibility of freeze-ups . . . requires practically no maintenance. It *saves fuel* by keeping jacket water and lubricating oil *always* at the same, ideal temperature. And by circulating *clean, soft water*, it keeps jacket passages free from scale and dirt. That means lastingly efficient cooling and the resultant freedom from engine maintenance and repair work.

Where the F-M Evaporative Cooler replaces a heat exchanger using raw water, it effects a considerable saving in water and pumping costs. Yet despite all these advantages, it costs less than others to buy and to install.

Would you like the complete story? You'll find it in Bulletin FECD-2, which includes dimension drawings, piping diagrams, capacity tables, etc. To get a copy, write Fairbanks, Morse & Co., Dept. E-134, 600 S. Michigan Ave., Chicago.

FAIRBANKS-MORSE & CO.

Air Conditioning Division F-M Chicago

New Vertically Mounted Rotary Pump

A NEW vertically mounted rotary pump has just been put into production at the plant of the Blackmer Pump Company, according to an announcement by J. B. Trotman, General Sales Manager of the company.

This new pump has the typical Blackmer "Bucket Design" (swinging vane) principle and with the exception of minor changes in design necessary to allow for vertical mounting, it is a standard Blackmer Rotary Pump.

The unit now in production has a capacity of 150 gpm. at a pressure of 100 psi and is powered by a 15 hp. gearhead motor—300 rpm. on the pump shaft. The same type of pump and mounting is also furnished in capacities from 5 to 700 gpm. and in pressures up to 300 psi, for marine and a wide range of industrial applications.

The typical Blackmer "Bucket Design" of this pump enables it to handle a wide range of liquids, varying in viscosities from tar to naphtha. The pump is self-adjusting for wear, and there is practically no loss of volumetric efficiency during the life of the buckets (swinging vanes). An important feature of the pump is that when the buckets are completely worn out, the unit may be restored to its original efficiency by simply removing the head, pulling out the old buckets, replacing them with new buckets and replacing the head. This operation requires only about twenty minutes' time and may be done by any mechanic.

Information on this new Blackmer pump may be obtained by writing to Mr. J. B. Trotman, General Sales Manager, Blackmer Pump Company, Grand Rapids, Michigan.

★ ★ ★

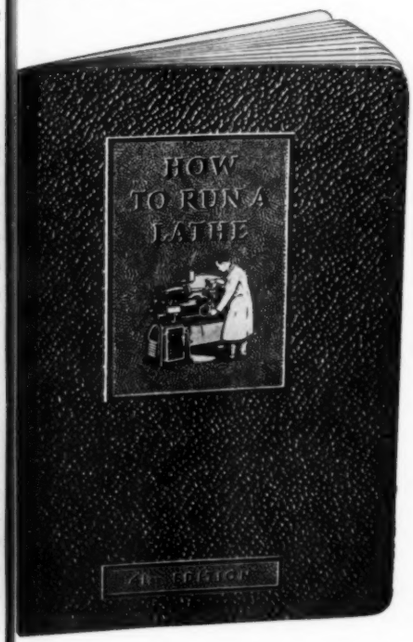
ANNOUNCEMENT of the award of contracts for construction of twelve tankers was announced on March 21 by the Maritime Commission. Eight of these coastal tankers will be constructed by Gray's Iron Works, Inc., Galveston, Texas, and four by Barnes-Duluth Shipbuilding Company, Duluth, Minnesota.

This makes a total of twenty-eight of these vessels to be ordered by the Commission since

the beginning of the current program; dimensions are as follows: length 220 ft., beam 37 ft., draft 12 ft. 10 in., and these tankers will be Diesel-propelled.

"How To Run A Lathe"

TO FURTHER increase the effectiveness of their lathe operators' handbook for defense training purposes, the South Bend Lathe Works has just issued the 41st edition of this popular book, "How To Run A Lathe." A number of changes in text material and illustrations have been made since the previous edition was printed in 1941.



This book contains the latest information on the operation and care of metal working lathes. It covers such subjects as the operation of the lathe units, grinding cutter bits, making accurate measurements, plain turning, chuck work, taper turning, boring, drilling, reaming, tapping, cutting screw threads, reference tables, etc. Written clearly and concisely, it is widely used as a shop text in schools and apprentice training courses. This edition contains 128 pages—5⅛" x 8", and over 365 illustrations. Copies are available for 25c postpaid. Write to South Bend Lathe Works, Department D2, South Bend, Indiana.

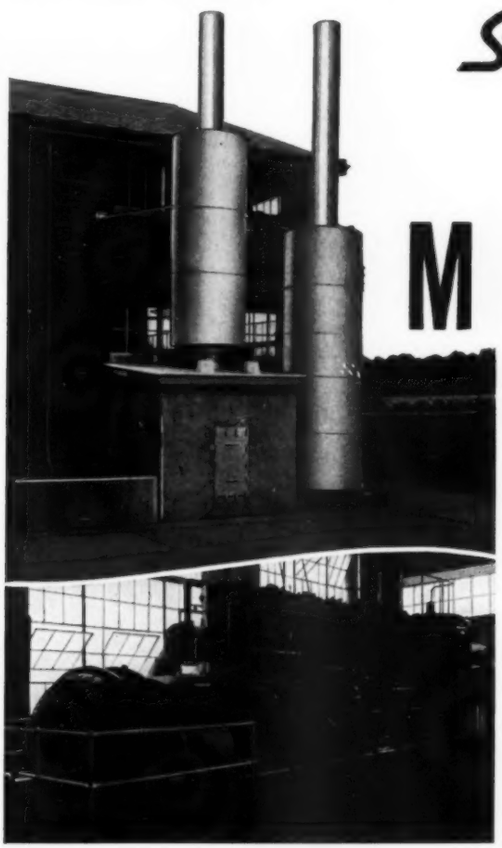
Conferences Discuss Diesel Cleaning Problems

WAR production conferences on cleaning and related manufacturing operation were held concurrently by the entire field, mechanical engineering, chemical research, and general headquarters staffs of Oakite Products, Inc., during April in New York, Chicago, and Los Angeles.

Sessions of the three-day program of each division conference were devoted to the discussion of improved ways to speed up output in connection with the production of essential war supplies. In this connection, particular emphasis is being placed on the production cleaning of iron, steel, brass, bronze, zinc, aluminum, magnesium, and other metals and alloys by tank and automatic washing machine methods before inspection, assembly, and finishing operations.

In addition to these and related production operations, each conference reviewed specialized methods and procedures for effectively handling some of the principal new cleaning problems regarding Diesel engine and accessory equipment maintenance that war conditions are bringing to factories, mills, transportation companies, and other concerns using this form of prime mover.

DIESEL EXHAUST and INTAKE *Silenced by* MAXIMS



When the municipality of Greenport, Long Island recently installed its fourth and largest Diesel engine, a two cycle 1427 h.p. Fairbanks - Morse Diesel, Maxims were chosen for both exhaust and intake silencing.

Maxims have a long record of successful operation on installations such as this one . . . installations where there can be no question of the effectiveness of the silencing and no danger of decreasing the efficiency of the equipment.

Silencers made by Maxim are engineered for long trouble-free duty. Construction is of welded sheet and plate steel, of such efficient basic design that practically no maintenance is required. Protective painting, of course, will add still more years to their life.

A municipal power plant is a tough 24 hour per day job, the kind Maxims are "built to take," but there are many other tough ones where Maxims are giving complete silencing, year in and year out.

Write today for recommendations from Maxim engineers for the solution of silencing problems, industrial or marine.

THE MAXIM SILENCER COMPANY

94 Homestead Ave. Hartford, Conn.

Topics being discussed from these standpoints include the speeding-up of inspection, repair and overhaul through faster cleaning of engine parts; safely removing lime-scale and rust deposits from Diesel water jackets and cooling systems to restore proper heat transfer; and cleaning lube oil and jacket-water coolers without dismantling.

General Motors Launches Huge Training Program

GENERAL Motors is organizing to take on a new and vital war assignment beyond the scope of its huge production effort. It announced a three-point program to help keep the planes and tanks and guns of the United Nations at highest possible fighting efficiency. Its reason: "the dependability and effectiveness of our products at the front may mean the difference between victory and defeat."

As disclosed by C. L. McCuen, Vice President in charge of Engineering, General Motors has advised the Army and Navy that it will:

1. Help train the enormous number of mechanics required to keep a modern task force in motion by maintaining schools for Army and Navy instructors.
2. Place its own engineers in the field to expedite reports on operating experience so that its war products can be improved constantly.
3. Assist the Army and Navy in having replacement parts on the spot when needed.

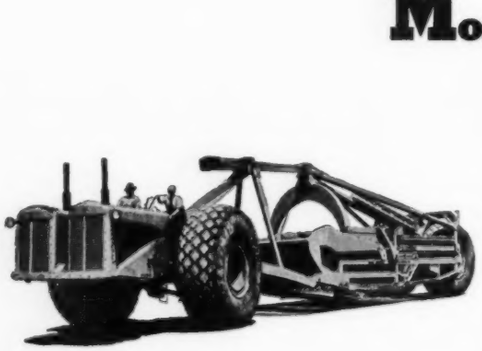
The training job alone calls for expenditures totaling not less than $5,000,000 for the current year. It will involve the training of thousands of instructors in scores of centers throughout the country.

The three-point General Motors program reflects the seriousness with which high Army and Navy officials view the maintenance problem in mechanized war. John E. Johnson, former sales manager, General Motors of Canada, Ltd., has been appointed director of the Department of Training Service—General Motors War Products. W. J. Davidson, a General Motors engineer of wide experience, will have charge of the Engineering Service Group—General Motors War Products, while M. D. Douglas, Chevrolet parts and accessories manager, will handle parts distribution. According to Mr. Johnson, the training activity is based on the "fundamental principle that it is the Corporation's obligation to do everything possible to facilitate the proper and efficient maintenance of the tremendous volume of war products after they have been delivered to the Armed Forces by General Motors."

Maj. Gen. Jacob L. Devers, Chief of Armored Forces, U. S. Army, discusses General Motors new three-point war maintenance program with C. E. Wilson, president of the Corporation, (left), and O. E. Hunt, vice president.

Present plans call for the Department of Training Service to assist in or operate schools for ten GM designed products and a similar number designed outside of General Motors. In the former category are trucks, Diesel engines,

Monster from Mars?



Monster from Mars? No. A gargantuan earth leveller for building and levelling airplane landing fields . . . Another product of American industry in the big parade to Victory. Like so many of the new and improved products of American inventive and industrial genius, this giant grader has American Blower Fluid Drive. The trend to Fluid Drive continues, too, in many such time-proved applications as Diesel motorships, pumps, fans, conveyors, excavators, trucks, oil drill rigs, etc. If you are looking to the future, plan to include American Blower Fluid Drive in your new or proposed products.

Fluid Drives *for Industrial, Marine and Automotive Use*

AMERICAN BLOWER
HYDRAULIC COUPLING DIVISION
DETROIT, MICHIGAN
Division of AMERICAN Radiator and "Standard" Sanitary Corporation

tanks, Allison aircraft engines and propellers. In the latter are air-cooled engines, guns of various sizes, planes and torpedoes.

The General Motors training program follows the design, standards and regulations set up for the armed forces and known as the Four Echelon System. Under the Four Echelon System the enlisted personnel of the armed forces is trained for four different types of maintenance work. In the first echelon are the men who operate the equipment in the field. In the second echelon are field mechanics working from light repair units. The third echelon includes men in semi-mobile shop units where major repairs and replacements are made, while the fourth echelon covers the permanent overhaul depots. General Motors will train instructors to train men for each of these four echelons, according to Army and Navy needs.

General Motors also has launched a cooperative program with the Armored Force Training Center at Fort Knox, Ky., and will train twenty-five men per month as Diesel engine instructors. This school has been set up at the General Motors Institute, and the first class was graduated recently.

Enterprise Engine Appoints

ENTERPRISE Engine & Foundry Co. of San Francisco announces the appointment, effective May 1, 1942, of Mr. Roy A. Hundley as Chief Engineer.

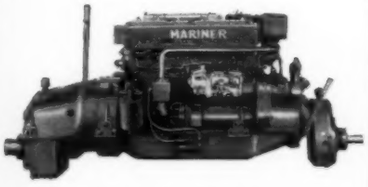
Mr. Hundley, a graduate of Stanford University in Mechanical Engineering, has been with Enterprise for the past seven years, during which time he has been associated closely with the development of this company's modern line of four cycle marine and stationary engines. In recent years, he has devoted his time primarily to the development and refinement of supercharged and lightweight, high output engines for the company.

Snap-On's New Torqometer

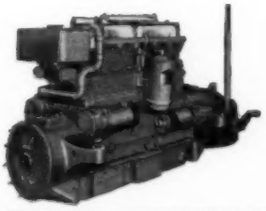
ACCORDING to the manufacturers, the Snap-on Torqometer has recently been greatly improved in its construction and method of measuring bolt torque. The new design incorporates a principle which has been known for generations, but which has never before been harnessed to the task of measuring the tension of nuts and bolts. The manufacturer tells us that they have experimented with a great number of methods for accurately determining exact bolt tensions, and the principle now employed is by far the most accurate that their engineers have adapted to this purpose.

This tool is a precision instrument which can be pre-set to any torque load and is used to set a series of bolts to an equalized, predetermined tension or torque . . . it is valuable aid

THE DIESEL THAT'S BUILT TO TAKE WHAT A WORK BOAT CAN GIVE IT!



MACK MARINER 605 W FOR WORK BOATS, 100 sustained h. p., at 1500 R.P.M. Bore 4⅝". Stroke 6"— 6 cylinders, Lanova combustion.



MACK MARINER 457 W FOR WORK BOATS, 70 sustained h. p., at 1500 R.P.M. Bore 4¼". Stroke 5⅜"— 6 cylinders, Lanova combustion.

• Tough, rugged Mack Mariners are built to extra factors of safety—are conservatively rated on a continuous duty basis. Power is quick-starting, smooth, shockless, sustained. When you buy a Mack Mariner you get the advantages of 4-cycle efficiency and Lanova controlled-combustion. Operating costs are at a minimum. Drop a postcard for complete information today.

Mack Manufacturing Corp., Marine Engine Division, L. I. City, New York

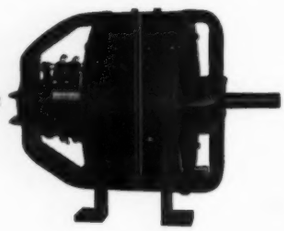
GOING DIESEL? BETTER GO MACK!

Mack DIESEL MARINE POWER

MACK MARINE ENGINES ARE A PRODUCT OF THE BUILDERS OF WORLD-FAMED GASOLINE AND DIESEL-POWERED TRUCKS, BUSES AND FIRE APPARATUS

COLUMBIA

A.C. and D.C. GENERATORS



Dependable performance is one of the chief advantages of Columbia A.C. and D.C. Generators. They are designed and widely used for light and power service and are ideal for use as ship auxiliaries. They are light in weight, compact and can be furnished in single bearing type for direct connection to engines.

Columbia D.C. Generators range in size from 7½ to 200 KW, 36, 60, 125 and 250 volts and in speeds of 1750, 1450, 1150 and 850 R.P.M.

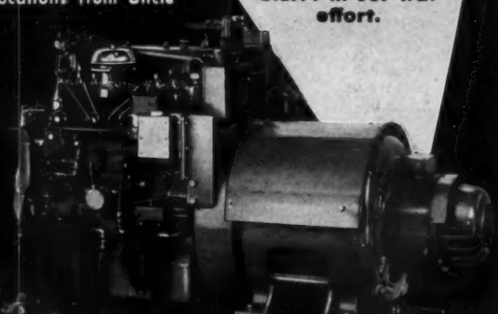
A.C. Generator sizes range from 6¼ to 300 KVA. Speeds: 1800, 1200, 900, 720, 600, 514 and 450 R.P.M. Single or three phase; direct connected or belted exciters.

COLUMBIA ELECTRIC MFG. COMPANY
4519 HAMILTON AVENUE CLEVELAND, OHIO

U.S. DIESEL
ELECTRIC
PLANTS

Two, four and six cylinder models—5KW to 94 KVA. Now, and for the duration, our entire output is subject to allocations from Uncle Sam.

On land, sea and in the air—U.S. Electric Plants are delivering their full measure of DEPENDABILITY in our war effort.



UNITED STATES MOTORS CORP.
OSHKOSH, WISCONSIN

in eliminating mechanical distortion caused by unevenly tensioned nuts and bolts.

These new Torqometers are available in seven sizes with capacities from zero to 1500 ft. lbs. The five smallest sizes are available with or without a flash light signal—on the two largest sizes this light is standard equipment. This light signal is especially useful where lighting conditions make it difficult to read the dial . . . the dial is set to the required tension or bolt torque and the light flashes the instant this tension is reached. Constant use of these instruments at their highest dial capacities will have no detrimental effect on their working parts, as the dial capacity is purposely kept well under the actual load limits.

For further information write Snap-on Tools Corporation, Kenosha, Wisconsin.

Crocker-Wheeler Announces New Type Enclosed Motor

COWL-COOLED is the name given to the newest fan cooled motor developed by the Crocker-Wheeler Electric Manufacturing Company, Ampere, New Jersey.

This motor of ultra modern design is especially adapted for use in dusty locations and for all applications where the conventional type of totally enclosed motor has previously been recommended.

Because the ventilating air is blown over the external ribs, which run the length of the frame, and is not forced through internal passages, trouble-free operation is assured, even in atmospheres containing excess amounts of destructive fumes, abrasive dust, oil or dirt.

These motors are built to meet severe operating conditions and are now available in standard NEMA frame sizes up to 20 hp. either ball or sleeve bearing equipped. The sleeve bearing construction is of especial interest to manufacturers and users of precision tools where delicate balance and freedom from vibration are of paramount importance.

New Division of Young Radiator Formed

WITH the need for aeronautical heat transfer equipment rapidly increasing as the production of military planes hits full stride, Young Radiator Company has enlarged its Aircraft Products Division to handle the design, engineering and sale of Young aircraft oil temperature regulators, supercharger intercoolers, engine warming devices, light-weight cabin heaters and other products for this field.

The new division which will be under the direct supervision of J. J. Hilt, Vice President, will be staffed by members of the organization who have been active in the development of Young Aircraft products. Heading the engineering work of the division will be J. C. Shaw, well-known aircraft engineer who has just joined Young Radiator Company.

J. C. Shaw

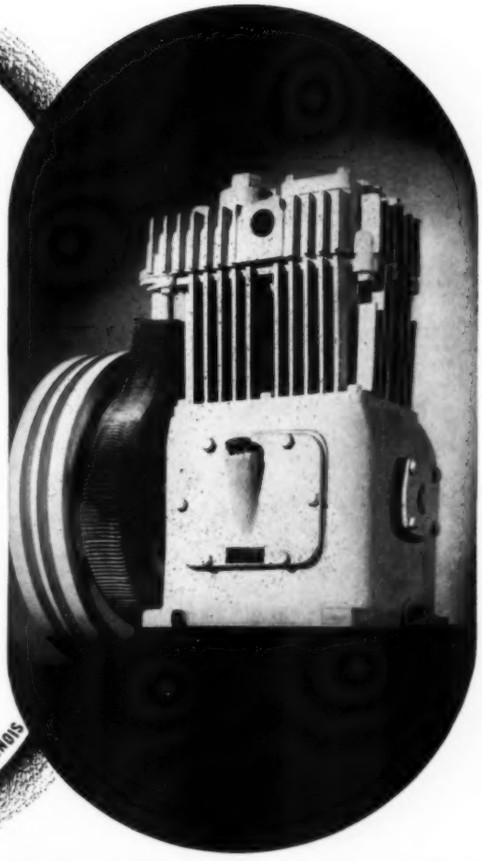
Mr. Shaw has been engaged for the past five years in general engineering work on aircraft accessories and has specialized in the development of heat transfer equipment. He is a graduate of Purdue University where he received a Bachelor of Science degree in Mechanical Engineering.

ACCENT ON DEPENDABILITY

Quincy Compressors have proved their *dependability* for starting and other services on thousands of Diesel installations. Our entire organization specializes in designing and making air compressors *exclusively*. For services requiring intermittent pressures up to 500 lbs. per sq. inch. If you have compressed air problems in connection with war production, ask a Quincy Engineer to make recommendations.

Quincy COMPRESSORS

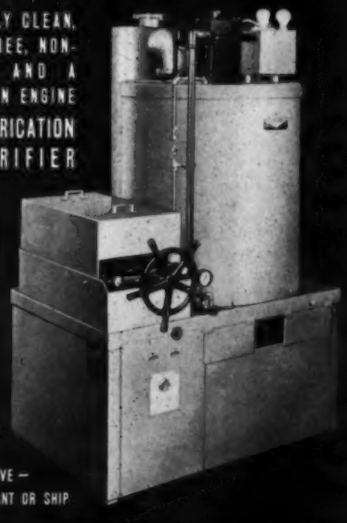
QUINCY COMPRESSOR CO., 452 MAIN ST., QUINCY, ILLINOIS



For Assurance

...OF REALLY CLEAN, DILUTION-FREE, NON-ACID OIL AND A REALLY CLEAN ENGINE

A YM LUBRICATION PURIFIER



WELL DESIGNED, EFFICIENT AND ATTRACTIVE — FIT FOR ANY POWER PLANT OR SHIP

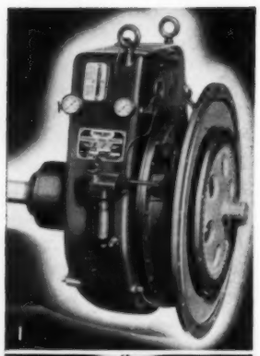
YOUNGSTOWN MILLER CO., INC. PO DRAWER S 829 SANDUSKY, OHIO

No time to lose!

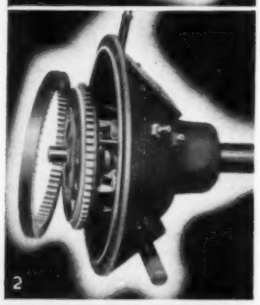
● America at war cannot afford a single minute of lost production due to breakdowns or preventable delays. Every minute saved brings us closer to our goal: Winning the War!

In all types of production machinery, Twin Disc Clutches are giving the dependable service that only years of research and specialization can assure.

No matter where your plant may be located, you can be sure of competent service or parts for your Twin Disc Clutches, Power Take-offs or Hydraulic Drives. Strategically located throughout the country are 7 factory branches and 30 parts stations, all prepared to meet your service and parts need at any hour of the day or night. Complete stock of parts assures prompt shipment, even for exceptional or unusual demands. This complete service organization protects you against interrupted production, helps you to maintain emergency schedules. TWIN DISC CLUTCH COMPANY, 1345 Racine Street, Racine, Wisconsin.



1. *Twin Disc Hydraulic Torque Converter. In considering installation, ask for complete data and specific recommendations.* 2. *Twin Disc Power Take-off for engines having up to 285 hp. output. Sizes: with single plate clutches, 6½" to 24"; double plate, 11½" to 18". Housing sizes: No. 6 S.A.E. to No. 00 S.A.E.*



2

Alabama: Montgomery, Parts Service Corp. **California:** Los Angeles, Charles W. Carter Co.; San Francisco, Charles W. Carter Co. **Colorado:** Denver, Liberty Trucks & Parts Co. **Florida:** Jacksonville, Motor Parts & Supply Co. **Illinois:** Chicago, Wisconsin Industrial Parts. **Kansas:** Great Bend, Scheufler Supply Co. **Kentucky:** Lexington, Wombwell Auto Parts Co. **Louisiana:** New Orleans, Mechanical Equip. Co. **Maine:** Portland, Southworth Machine Co. **Massachusetts:** Boston, Rapp Huckins Co., Inc. **Michigan:** Detroit, W. C. Ducomb Co., Inc. **Minnesota:** St. Paul, Truck Parts, Inc. **Missouri:** St. Louis, Twin Disc Clutch Co. **New York:** Buffalo, Edward W. Rodie; New York, Twin Disc Clutch Parts & Service of New York, Inc. **Ohio:** Cincinnati, C. McCash; Cleveland, Twin Disc Clutch Co.; Cleveland, Industrial Engine Parts. **Oklahoma:** Tulsa, Twin Disc Clutch Co. **Pennsylvania:** Philadelphia, Twin Disc Clutch Parts & Service of Philadelphia; Pittsburgh, Contractors Equip. Ser. Co. **Tennessee:** Knoxville, Automotive Equip. & Supply Co.; Memphis, Choctaw Culvert & Machinery Co. **Texas:** Dallas, Twin Disc Clutch Company; Fort Worth, John Muller Co.; Houston, Portable Rig Co., Inc.; John Muller Co. **Utah:** Salt Lake City, Lund Machinery Co. **Virginia:** Richmond, Standard Parts Corp. **Washington:** Seattle, Twin Disc Clutch Co.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U. S. PAT. OFF.

PETROMETER

FOR TANK GAUGING EQUIPMENT FOR DAY TANKS & CLEAN OIL STORAGE

PETROMETER CORPORATION
8 STAR SQUARE, LONG ISLAND CITY, N. Y.

PUMPS FOR ARMY • NAVY • AIR FORCE • MARINE • AND INDUSTRIAL APPLICATIONS

tuthill pumps
HELP SAVE MATERIAL, LABOR, TIME & SPACE ON PRODUCTION MACHINERY

Model M COOLANT PUMPS

Tuthill Model M internal-gear, positive displacement rotary pumps are doing an outstanding job, handling cooling oils on machine tools in war-time production.

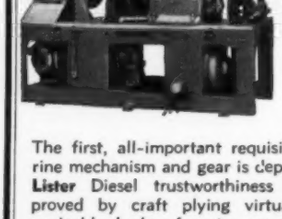
MODEL M—A compact design with a built-in safety or by-pass feature. Suction and discharge zones are separated by hydraulically balanced shoes which (1) act as a by-pass by lifting off the rotor when the spring pressure (set between 10 and 20 p.s.i.) is exceeded—thus permitting chips and small particles of grit to pass through without injury to working parts; and (2) compensate for wear. Six sizes from 1 to 50 g.p.m.

MODEL MS (Stripped Pump)—This pump is the same as Model M without the supporting bracket. It saves material and space because it can be incorporated directly into your machine.

Write for complete Catalog describing these and other dependable Tuthill Pumps for Production Machinery and scores of war-time applications.

TUTHILL PUMPS
TUTHILL PUMP CO., 933 E. 95th St., Chicago, Ill.

Complete Diesel
Marine Auxiliary Units



Type 18/2 Combination unit 10 kw., 44 cfm., 250 gpm.

The first, all-important requisite of marine mechanism and gear is dependability. **Lister** Diesel trustworthiness has been proved by craft plying virtually every navigable body of water on the globe. Ruggedness, ease of maintenance, unsurpassed economy, and smoothness of operation on a wide range of fuels—these are **Lister** qualities that you can unfailingly depend upon.

Write for Bulletin 150

LISTER-BLACKSTONE, INC.
1706 South 68th Street MILWAUKEE, WISCONSIN, U. S. A.

In his position, Mr. Shaw will be stationed at the Young Radiator Company's executive offices in Racine although it is expected that he will spend considerable time on field engineering projects in connection with the various plane and aircraft engine manufacturers throughout the country.

How Are Balls Made Round?

SKF Industries, Inc., has been asked the question, "How Are Balls Made Round?" so frequently that it answers all and sundry in an interesting new bulletin which is now ready for free distribution. This fascinating subject is treated in a most absorbing manner.

Brightly polished balls and rollers parade before keen eyes in this scientifically lighted and air-conditioned inspection room in the Atlas Ball Division of SKF Industries, Inc., Philadelphia. White gloves are worn by the girls to protect the balls and rollers from moisture.

Write for a copy of *How Are Balls Made Round* to SKF Industries, Inc., Front Street and Erie Ave., Philadelphia, Pa.

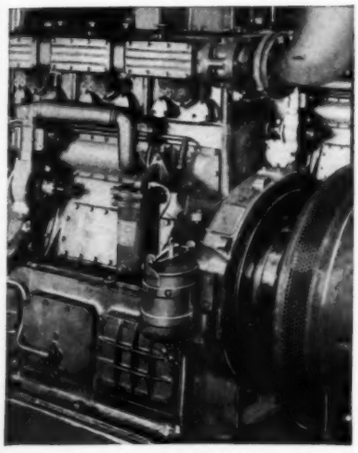
Appoints Advertising Manager

THE Cummins Diesel Engine Corporation of New York, 1120 Leggett Avenue, New York City, announces the appointment of Charles D. Cavett as advertising and sales promotion manager.

Mr. Cavett has been on the copy staff of Spencer W. Curtiss, Inc., Indianapolis industrial agency, for the past three years and prior to that time was engaged in newspaper and publicity work in Ohio, California, and New York.

Alco Announces A New Time-Saving Device for Engineers

THE Alco Mean Temperature Difference Calculator is a slide rule devised to aid in the approximation of heat transfer surfaces when preparing estimates or specifications for heat exchanger equipment. The M.T.D. calculator includes scales for logarithmic M.T.D. and for M.T.D. correction factors for one, two, three, four, and six shell passes, also "C" and



One of 3 Buda-Lanova 6-DH-909-55 kw Diesel-powered generator sets which are WGB-equipped with considerable oil savings.

Triple Savings with

WGB CLAROFIERS

1. Lubricating oils stay amber clear without centrifuging or oil change when WGB Clarofiers are part of circulating system. Maximum use from oil at a very minimum of cost and effort.

2. Occasional cartridge changes are made without tools. Filter elements are very inexpensive. WGB Clarofiers are strong, simple, permanent.

3. Diesel fuels can be freed from dirt and water with WGB Clarofiers inexpensively. Save expensive overhauls of fuel pumps, injection heads, valves and rings.

WGB Clarofiers are standard on many stationary and automotive Diesels. Write for this new, free 16-page descriptive book.

WGB
OIL CLARIFIER, INC.
KINGSTON, N. Y.

"D" scales which permit multiplication and division operations. A limited supply of these useful time saving Alco M.T.D. calculators and instruction sheets is available at $.25 each through the Alco Products Division of American Locomotive Company, 30 Church St., New York, N. Y.

New Switchboard Watthour Meter

FOR industrial and central station use, a new line of switchboard watthour meter is announced by Westinghouse Electric and Manufacturing Company.

Known as Type CB, the units are available for metering all the various combinations of single phase or polyphase power. Mounting styles are flush, projection and a detachable or plug-in construction. The detachable models can be readily removed for overall inspection and test without interrupting the circuit. All the calibration adjustments are accessible from the front when the molded glass covers are removed.

The CB single phase meters in this line have one electro-magnet and are applicable to single phase circuits. The CB meters for the usual 3-wire single phase circuits have 3-wire current coils. CB-2 meters have two 2-wire ele-

FOR LUBRICATING
OIL PURIFYING

Specify

HILCO

A complete line of lube oil purifiers using Fullers Earth – cotton waste and specially prepared filtering agents

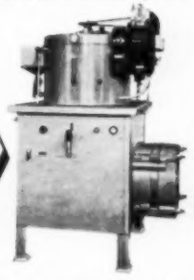
HILCO OIL RECLAIMERS

A simple, economical and foolproof method of restoring contaminated oil to the full value of new oil,–for direct connecting to one or more Diesel engines for continuous or intermittent operation.

HILCO HYFLOW OIL FILTERS

A superior oil filter for perfect filtering of Diesel engine lube oil–for direct-connecting to one or more engines – continuous or intermittent operation.

HILCO AIRLINE OIL PURIFIERS



A perfect method for contact oil purifying for complete oil reconditioning. For batch purifying directly from engine lube oil system or transfer tanks.

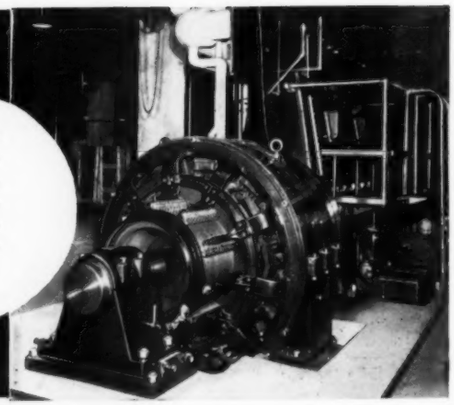
The HILCO line offers you a *complete* lubricating oil purifier service. *Write for free literature* and see what HILCO operators are doing–then let us help you select a HILCO to take care of "That Particular Job".

OIL PURIFIER HEADQUARTERS

THE HILLIARD CORP.
122 W. 4TH. ST., ELMIRA, N.Y.

BURKE A·C-D·C GENERATORS

BURKE, not one of the biggest names in generator construction, but certainly one of the oldest, has always been known for quality rather than quantity. Today, with the spur to more power in a hurry, Burke quality goes into 24-hour production lines to provide Diesel Engine users with a husky well-built A. C. or D.C. Generator or Motor to meet any specified conditions up to 1000 K. W. or 1000 H. P. *Write for specific information.*



BURKE ELECTRIC CO Erie, Pa.

MANZEL FORCE FEED LUBRICATORS *for* MOST EFFICIENT DIESEL ENGINE LUBRICATION

Model "94"

Dependable Manzel lubrication insures maximum power and long life for an engine.

Once feed is set, Manzels deliver exactly the desired amount of oil with each pump stroke. They start, stop, speed up and slow down with the engine.

There is no waste with a Manzel. Every drop of oil is delivered to a lubrication point.

Write for Catalog 94-B

MANZEL BROTHERS CO.
275-277 Babcock St. Buffalo, N. Y.

Atlantic Seamless Flexible Metal Hose

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SAFETY CONTROLS
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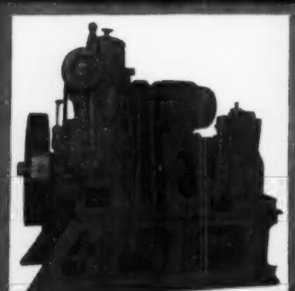
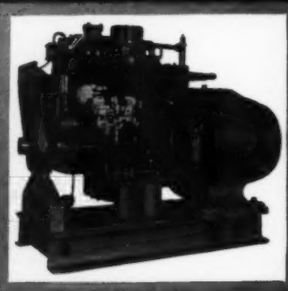
DIESEL PATENT FOR SALE

British Owners of valuable patent pertaining to Diesel engines are prepared to negotiate on a royalty or outright purchase basis the manufacturing rights for the U.S.A. and Canada. Shillan, Britannia House, Ampton Street, London, W.C.1.

REINER DIESEL *Marine Auxiliary Units*



- Marine auxiliary units 5 to 60 hp., 1 to 6 cylinder.
- With any generator —pump — compressor combination required.
- Generator sets 3 to 75 kw.
- *Special auxiliary units designed to individual requirements*

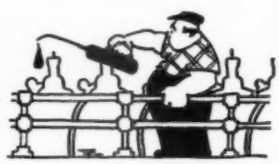


JOHN REINER & CO., INC., *Long Island City, N. Y.*

ments and may be used on single or 3-phase, 3-wire circuits, and on 2-phase, 3-or 4-wire circuits. CB-3 meters consist of three 2-wire elements. They are used to meter 3-phase, 4-wire star-connected circuits and, when used with instrument transformers, to totalize combined 3-phase, 3-wire and single phase, 2-wire or 3-wire loads.

The CB-8 meters are of the two disk type and have two 3-wire electromagnets interconnected to form a 3-current coil meter. These are used on 3-phase 4-wire star connected service and are fully accurate wherever the voltages are not extremely unbalanced. CB-10 meters are of the two disk type and have two separate 3-wire elements. They are used on 2-phase, 5-wire service.

Additional information may be secured from booklet IL 42-104.1 by writing department 7-N-20, Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania.



New Engineering Bulletin Released on Purification of Industrial Oils

THE APPLICATION of oil purification to Industrial Oils is fully discussed in a new Engineering Bulletin No. 58 which has just been released by the Honan-Crane Corporation.

Oil purification is being successfully applied to cutting oil, insulating oil, roller backup bearing oils, hydraulic oils, honing oils, compressor oil, fuel oils and other industrial oils. The Bulletin gives an outline of the benefits obtained from the purification of each of these kinds of oil and, in any operation where oil is used more than one time, it may be of great service. Write Honan-Crane Corporation, Lebanon, Indiana, for Bulletin No. 58.

Westinghouse Has Developed New Slide Rule Selector For Motor and Control

A POCKET size "slide rule" selector for electricians, plant maintenance men, and others interested in the selection of electric drive equipment has recently been announced by Westinghouse Electric and Manufacturing Company.

To guide in the selection of the proper type of motor for each of forty-four industrial applications, a convenient table lists the various uses and indicates which of the four principal types of a-c motor should be selected. The specifications, performance ratings and control classes for the required type is readily determined by making the corresponding setting on the slide.

Information is obtained from the selector by setting the cardboard slide for the proper motor type and then reading its specifications through the window in the acetate envelope. Pertinent facts such as horsepower ratings, speeds, voltages, frequencies, and starting and pullout torques are thus secured. The reverse side of the selector shows which of the various magnetic and manual controls are available for each type of motor and lists the proper control number.

This motor and control Electric Drive Selector, SA-714, can be obtained from Westinghouse district offices and distributors.

Here are two Ropers transferring fuel oil at Ludlow Sales Manufacturing Diesel installation—Edge Moor, Delaware.
Remember there's a Roper for lubrication, cooling and transfer.
CAPACITIES—1 to 1000 g.p.m.
SPEEDS—up to 1800 r.p.m.
PRESSURES—up to 1000 lbs. p. s. i.
Write for Catalog 951 and send us your pump requirements.
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Double Seal Ring Co. ★ Main Plant and Office FORT WORTH, TEX.

Robert A. Wickes Appointed Secy-Treas. of American Bosch Corporation

ROBERT A. WICKES was recently appointed Secretary and Treasurer of American Bosch Corporation, Springfield, Mass. He succeeds

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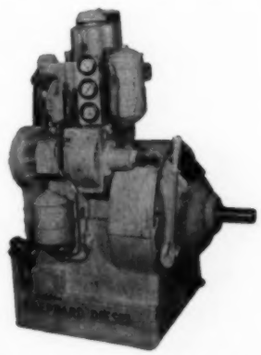
PRECISION BEARINGS
BALL • ROLLER • THRUST
for every load, speed and duty
NORMA-HOFFMANN BEARINGS CORP.
Stamford, Conn.

DIESEL
MARINE
AUXILIARY UNITS

SHEPPARD Model 7, single cylinder full Diesel conservatively rated 8 hp. at 1200 r.p.m.



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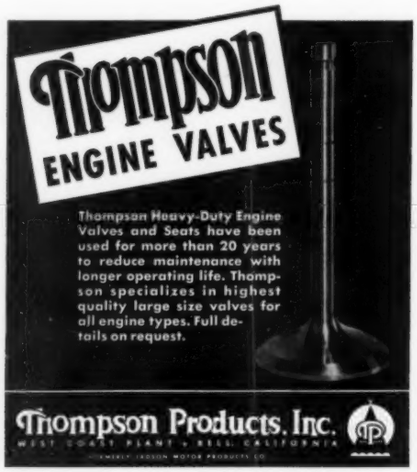
Owners—Spearin, Preston & Burrows, New York.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ENGINE VALVES
Thompson Heavy-Duty Engine Valves and Seats have been used for more than 20 years to reduce maintenance with longer operating life. Thompson specializes in highest quality large size valves for all engine types. Full details on request.
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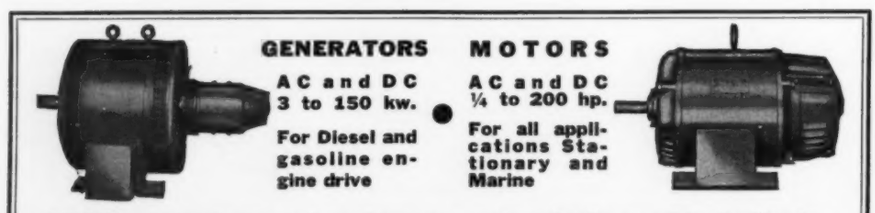
Carl C. Francis who resigned to accept the presidency of the Putnam Trust Company of Greenwich, Connecticut.

Robert A. Wickes

Mr. Wickes came to his new position from the B. F. Goodrich Company, where he was Comptroller and Office Manager of American Anode, Inc., Akron, Ohio, a subsidiary of Goodrich. He previously held the position of Assistant Secretary and Treasurer—and finally General Manager of the Gas Machinery Manufacturing Division of the Koppers Company at Fort Wayne, Indiana. For many years he was a member of the Ernst & Ernst staff at Pittsburgh, Pa.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For Diesel and gasoline engine drive
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STAR generators and motors are extensively used in both stationary and marine service. STAR gear motors are made in both planetary and worm gear types with and without integral brakes.
STAR ELECTRIC MOTOR CO. BLOOMFIELD, NEW JERSEY

Latest Diesel Patents

A description of the outstanding patented inventions on Diesel and Diesel accessories as they are granted by the United States Patent Office. This information will be found a handy reference for inventors, engineers, designers and production men in establishing the dates of record, as well as describing the important Diesel inventions.

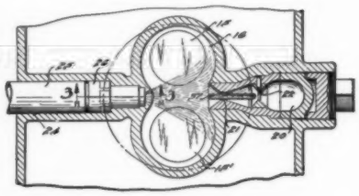
Conducted by C. CALVERT HINES*

INJECTION ENGINE

Howard H. Dietrich, Detroit, Mich., assignor to Chrysler Corporation, Highland Park, Mich., a corporation of Delaware

Application December 20, 1937, Serial No. 180,706

3 Claims. (Cl. 123—32)



2. An injection engine comprising a cylinder and a piston operating therein, a combustion chamber overlying and opening into said cylinder, an inner air storage chamber having a restricted orifice and opening into said combustion chamber, a fuel injection system for intermittently discharging successive fuel charges and having a discharge portion communicating with said combustion chamber, means in said discharge portion for so agitating fuel flowing therethrough as to facilitate atomizing thereof in said combustion chamber, and a reservoir in advance of said means adapted to accumulate a portion of each charge between successive dis-

* Patent Attorney, 811 E Street, N.W., Washington, D. C.

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For Marine and Stationary Diesel Installations
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77-35 113th Street
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for Installation by
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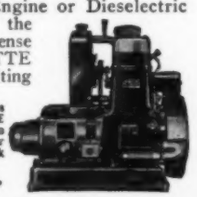

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A modern lubricator for modern service on Diesel, gas, steam engines and compressors. Supplies dependable cylinder lubrication in metered quantities reducing friction and wear. Capacities: 2 to 24 pt. and 1 to 16 feeds. New catalog on request.

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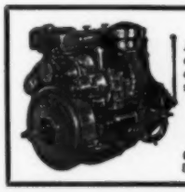

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Based on the Engine developed and built by General Motors, adapted and equipped for marine use by Gray.
1 to 6 cylinders, 25-165 H.P.
Both Rotations
Reduction Ratios to 4.4:1
Fresh water cooling is standard
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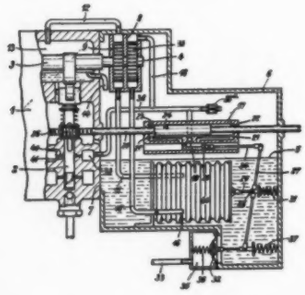
charging operations of said system for introduction into said air chamber in an unatomized state before the agitated part of each charge is discharged.

2,214,766
INJECTION PUMP FOR INTERNAL COMBUSTION ENGINES
Max Hurst, Stuttgart, Germany, assignor to Robert Bosch Gesellschaft mit beschrankter Haftung, Stuttgart, Germany.
Application October 7, 1938, Serial No. 233,845
In Germany October 19, 1937
5 Claims. (Cl. 123—140)

1. A piston type injection pump for fuel injection in internal combustion engines, comprising control means for adjusting the fuel amounts delivered by said pump, a hydraulically operated piston-servomotor connected with said control means, a casing in which said servomotor is located, at least one inlet opening through which lubricating oil enters said servomotor for driving its piston in each of its two working directions, at least one outlet opening in said servomotor from which the used lubricating oil enters the casing, a common cam shaft for driving the pistons of said injection pump, said cam shaft being located higher than the oil level of said casing, one end of said cam shaft extending into said



casing, a lubricating oil delivery pump driven by said end of the cam shaft, an oil chamber in which the cams of said shaft rotate, and a pipe connecting said chamber with the pressure side of said lubricating pump, while the suction side of said lubricating pump is connected with the lower oil containing part of said casing.

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